# A D E N O I D S

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# ADENOID GROWTHS IN CHILDREN.

Adenoid growths, or hypertrophy of the pharyngeal tonsil, is an exceedingly common complaint in childhood, and considering the many morbid conditions which they may give rise to, one of the first importance.

As material for this thesis I have collected some fifty cases which I have seen in private practice, and though such a comparatively small number may not have given much information of great statistical value in such a common complaint, they serve to show a large variety of the results of this morbid condition, and they illustrate its great importance as it affects the health of the unfortunate sufferer.

I have also chosen the subject as it affects childhood, as though adenoids, or adenoid remains, are often to be found in later years, they are not only much commoner at the more tender age but their effects are much more marked, and the damage which we see resulting from them in adult life is nearly always brought about in childhood, the reasons for

which will be seen in dealing with the symptoms and signs.

I propose to discuss the subject in ordinary text-book fashion - oetiology, anatomy and pathology, symptoms, complications, diagnosis, prognosis and treatment, making up as far as possible for the short-comings of my cases by the literature I have been able to collect on the subject.

I shall also use the term 'Adenoids' in preference to the unwieldy, though scientifically more correct name of 'hypertrophy of the posterior pharyngeal or Luschka's tonsil.'

First of all, tribute must be paid to the work of Hans Wilhelm Meyer of Copenhagen, with whose name the subject of adenoids will always be associated. He discovered their existence and recognised their importance in 1860, and laid his discovery before the profession in a paper to the Royal Medical and Chirurgical Society in 1869, and since then the work which has resulted from the stimulus of his discovery has been the means of relieving many thousands of children from the perils and discomforts which their presence entails. In my own experience I have been struck with the great variety of symptoms and complications which the cases presented as the direct

or indirect results of their presence, and consequently with the very great importance of this pathological condition as affecting not only the present health of the child but as resulting in permanent deformity, such as in the case of the face or chest, or in permanent damage, for example to such an important structure as the ear.

It is surprising that so common and so important an affection should have escaped the serious attention of the medical profession until so recently, especially when one considers the activity of research during the last hundred years. It was noted by various observers, e.g. Czermack, Voltolini and Lowenberg, before Meyer's original communication appeared, but to him belongs the honour of the discovery because he alone attributed to them their proper importance.

As to their great importance there is no question: "it has been computed that at least 80 per cent of all cases of deafness are due to adenoids, and at least half of these are cases of suppuration"[1]. In my experience of deafness in children, by far the greater number of cases were due to this cause and the majority were cured or improved by treatment. But besides this liability to ear affections there

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(1) Macleod Yearsley 'Adenoids' p.11

are the other important results of their presence in the great tendency to repeated colds and catarrhs, which, though they may be unimportant enough as individual attacks, yet, by being constantly repeated, leave the mucous tracts in a weak and irritable condition, favourable to the entrance of various pathogenic organisms and seriously interfere with the general health, thus rendering the subject prone to various diseases. The results, in fact, of these overgrowths may be said to be legion, as they are answerable for a very large variety of symptoms. The lymphatic system generally, in childhood, being in a state of great activity is very prone to inflammation, and following that, to enlargement, so it is not surprising to find the faucial and pharyngeal tonsils, which belong to this system and which are in such an exposed position, guarding the entrances of the respiratory and alimentary passages, becoming hypertrophied in a large number of children and more often than any other lymphatic glands. Their proneness to enlargement, as hinted above, is due largely to their exposed position at the upper end of the respiratory tract where they are open to infection from various forms of aerial poison, bacilli and particles of matter which are likely to

lodge when inhaled and set up irritation, thus giving rise to a vicious circle, the irritation leading to inflammation and enlargement, which again favour the lodgement of more irritating matter and increase its facility for doing harm, especially in those who are in delicate health or who live in unhealthy surroundings and are constantly exposed to such conditions of irritation.

Adenoids are no respecters of class, nor would we expect this to be so, seeing that lymphatic activity and the entrance of irritants are common to all children: in my experience, however, their occurrence has been more frequent in the poorer classes, and I attribute this largely to the less healthy dwellings, the stuffier rooms and the neglect of slight catarrhs among the poor, and also to the fact that among them it is so sommon to find four or five (or more) individuals sleeping in the same room, with door and window carefully and tightly closed, the results on the atmosphere produced being very apparent to anyone who is happily possessed of healthier instincts and is accustomed to open windows and fresh air.

## ETIOLOGY.

As in most morbid conditions, the causes of adenoids may be divided into two sets (a) Predisposing (b) Exciting, the two being intimately associated.

AGE plays an important part in the occurrence of adenoids, and this is what we would expect in a condition which affects a part of the body which in childhood is so extremely active, for we know that the more active a part is the more subject it is to inflammatory affections, and these play a large part in the formation of adenoids. Practically all the cases I have had to deal with in practice have been children: a very few have occurred in adults in whom the condition has persisted since childhood. Of my 50 cases, 13 occurred under six years of age, 27 under eleven years, and 10 at or over eleven, showing this by far the greatest incidence between five and ten years: these figures however do not indicate accurately the age at which adenoids are most common, as many of the children had suffered for a considerable time - months or even years before being brought under notice. They do, however, correspond with the figures of other observers on the

subject, e.g. McBride and Logan Turner[2] in 488 cases noted the ages as follows:-

| | | | |
|---|---|---|---|
| 0 - 5 years | 57 | 26 - 30 years | 24 |
| 6 - 10 " | 141 | 31 - 35 " | 18 |
| 11 - 15 " | 115 | 36 - 40 " | 4 |
| 16 - 20 " | 86 | 41 - 45 " | 1 |
| 21 - 25 " | 38 | 46 - 50 " | 4 |

But it is interesting to note that in 80, only adenoid remains were found, as follows:-

| | |
|---|---|
| Under ten years | 1 |
| " fifteen years | 6 |
| " twenty years | 13 |
| " thirty years | 41 |
| " forty years | 15 |
| " fifty years | 4 |

which considerably diminishes the number of adults and makes practically no difference to the number of children.

Meyer's first 102 cases showed ages as follows[3]

| | | | |
|---|---|---|---|
| Under 5 years | 3 | 20 - 25 years | 11 |
| 5 - 10 " | 34 | 25 - 30 " | 1 |
| 10 - 15 " | 25 | 30 - 35 " | 4 |
| 15 - 20 " | 21 | 35 - 40 " | 1 |
| | | 40 - 45 years | 2 |

Parker[4] in 50 cases had twenty-nine under 10 years, fourteen under 16, five under 20 and two over 20.

(2) Edinburgh Medical Journal, April, May & June 1897.
(3) Yearsley 'Adenoids'.
(4) Parker 'Post-nasal Growths'.

In Yearsley's[5] 307 cases, the great majority were from 3 - 16 years.

These figures all go to show that the condition is essentially one of childhood and that the majority of cases occur between the ages of 5 and 15 years, and that cases occurring in adults are nearly always remains of the growths from childhood.

SEX. So far as statistics show, sex has practically no influence on the occurrence of adenoids. My fifty cases consisted of 27 males and 23 females. Yearsley[5] had 156 males and 151 females; Parker[6] 26 males, 24 females. These figures all show a slight excess of males, but an excess so small that no importance can be attached to it.

As to RACE, I believe that no race of man is exempt from them, and that they are particularly common among Jews.

CLIMATE has a more or less important effect on the occurrence of adenoids, as they are commonest in damp, cold countries, where there is more likelihood of catarrh.

The question of the influence of HEREDITY as it affects adenoids is an uncertain one. When one meets, as is often the case, with several examples in the same family, the difficulty lies in determin-

(5) Yearsley Op. Cit.
(6) Parker Op. Cit.

ing to what extent heredity is answerable or whether the occurrence is due to faulty hygienic or other conditions. From my own experience I incline to the view that inheritance has a good deal to do with it in many cases, especially as a predisposing cause, but that the principal factor is improper hygiene. My reasons for thinking heredity important are that I have come across several families in which, so far as I could find out, there was no fault to be found in the hygiene, and yet, almost every one of the children was a sufferer from adenoids: for example, a family I attended in a healthy district of central Scotland, showed well marked adenoid growths in four members out of five, the fifth being a baby in whom no signs of adenoids were present: in this case also the mother showed the pinched nose and tendency to open mouth, though I could get no definite evidence of their previous existence in her. The surroundings were very healthy and the children led out-of-door lives: they were frequent sufferers from colds, but this I put down rather as an effect than as a cause of the adenoids.

Another family in the same district, and of undoubtedly healthy surroundings showed four cases out of a membership of six. In another case, this time

in a family of five, living in a large city and with a markedly tubercular family history, all five members had been sufferers from adenoids, and of these four had died since they were operated on, two of meningitis following on middle ear suppuration, and two of 'bronchitis', one of these having markedly enlarged cervical glands.

Besides these instances I have frequently come across two or more cases occurring in the same family, and though none of them could be taken as absolute proof of the influence of heredity, yet they point strongly in that direction.

On the other hand, many instances of the occurrence in several members of a family could be safely put down to unhealthy habits or to constantly recurring colds going the round of the house. As an example which I am sure was due to these causes I give the case of a family of three children in a healthy part of the South of Scotland, of whom two showed well marked adenoids which were operated on and the third, a child of two, gave every promise of their subsequent development to judge from the frequency with which he took cold and the persistent mucous discharge which was always in evidence from his nose, though in his case no adenoids could be felt. This family was one of those who have a terror

of 'draughts' and consequently, though five slept in the one room, doors and windows were carefully closed, and, in winter at any rate, a large fire was kept on: the atmosphere in the morning can be better imagined than described, and it was small wonder that a cold of some sort was a constant visitor. After I had persuaded them to sleep with the window open, the parents gave me evidence for the better in their feeling of comfort on waking in the morning. This is one example out of several, but it shows the probability of the occurrence in several members of a family being due to the fact that they are all subjected to the same influences in the way of hygiene.

I therefore conclude, as far as my experience goes, that though there is every likelihood and evidence to show for it that heredity has a distinct influence on the condition, a more potent factor is that the same influences - stuffy rooms, colds, etc.- are brought to bear on the family as a whole, which, as a whole, is likely to suffer. Cases do occur, however, which lean to the side of the influence of heredity, in which the sufferer is very young, as in a case I had of adenoids in a child of three months, which is certainly an early age for external pathogenic influences to have made themselves so manifest.

Yearsley[7] mentions the fact that in his 307 cases, fourteen families had more than one sufferer, twelve showing two members, one showing four, and one showing eight. McBride and Logan Turner[8] cite 30 cases in which more than one member of the family was affected.

And while on the subject of unhealthy surroundings, it is well to state the effect they have in the production of adenoids. They act by directly exposing the subject to foul air, dust and organisms, and thus lowering the general vitality and resisting power. Most of us also have experienced the feeling of discomfort and stuffiness about the back of the nose which is occasioned by want of ventilation or over-heating in rooms, or by the inhalation of dust on dry and windy days, and the relief which comes on going into fresher, cooler or less dusty air. Those unhealthy conditions, therefore, occurring constantly in the life of a child, are bound to make it more liable to colds, and to cause congestion of the nasal and pharyngeal mucous membranes, which, being often repeated, or persistently present, soon gives rise to chronic inflammation and the development of adenoids.

"It is an undoubted fact that any condition of ill-health in infancy in which nutrition is impaired

(7) Op. cit.
(8) McBride and Turner Op. cit.

or rendered difficult, tends to be accompanied by an exaggeration of the normal activity of adenoid tissue manifesting itself by an over-development of the organs in which such tissue is most abundant such as the tonsils."(9)

Various Deformities, or as they might be almost better described, Anatomical Peculiarities, predispose to adenoids. One of the most marked in my experience is cleft palate: I think I am right in saying that every case of cleft palate which I have seen in children had well developed adenoids, and the occurrence of the two has been noted by all writers on the subject which I have read. Probably the reason for their common association with cleft palate is that the air is insufficiently warmed, in fact, practically not warmed at all, before it passes over the posterior pharyngeal mucous membrane, thus causing lessened resistance and greater proneness to attacks of catarrh and to be affected by the dust and organisms, which, instead of being entangled and destroyed in the nasal mucous membrane, pass directly on to the site of the adenoids. Another reason probably is that food is pressed during swallowing against a mucous membrane which is normally not subject to such conditions. High palates and

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(9) Dr R. Hutchison 'Lancet' May 7th, 1904.

V-shaped palates have been said to be very commonly accompanied by adenoids: so far as I can make out, their influence is doubtful. I have seen cases of the co-existence of the two, notably in a girl I saw recently, who was markedly deficient mentally, had a very high palate and narrow contracted jaws with irregular teeth: in this case there was a large mass of adenoids, but whether their presence was due to the physical peculiarity or was merely a coincidence I am not prepared to say. Probably the contraction of the nasal cavity caused by the high palate would make the symptoms of the adenoids more prominent, and having once started they would be liable to undergo enlargement from the difficulty they would cause in breathing and their consequent congestion. Some writers lay stress on the fact that these deformities cause adenoids because where there is obstruction there is necessarily diminished air tension behind it during nasal inspiration and therefore hyperaemia from over-filling of the blood vessels, which if long continued or often repeated would lead to hypertrophy. But I think that the amount of obstruction caused by an arched palate is not sufficient to cause the development of adenoids in this way, and practically I think it will be generally found that the chief obstruction lies at the

site of the adenoids, not in front of them, and that the narrow and contracted nasal cavities are more the result of want of use and diminished blood supply than the cause of adenoid growth. Other deformities of the nose may, by causing obstruction, predispose to adenoids, and several of such condition are noted by some authors, e.g. Parker[10] notes, besides cleft-palate, and high and V-shaped palates, the following: septal deviations, enlarged inferior turbinals, small anterior nares, contracted nasal fossae. Now any of these conditions, if they exist before adenoids are developed, may by their presence causing obstruction and consequent diminished air tension in the posterior nasal space, tend to the production of adenoids, and give rise to more marked symptoms than if they did not exist, but it seems to me that most of these conditions are a consequence, in the majority of cases, not a cause, of adenoids. Adenoids by their presence, interfere with the proper blood and lymph supply to the posterior nares: they also, by their obstruction, prevent the nose from carrying out its proper function, thus tending towards deficient development. The constant diminished tension inside the nose, caused by the obstruction to the entrance of air makes the alae nasi fall in at each inspira-

(10) Parker Op. cit.

tion to make good the deficiency, as can readily be seen in any one, especially in a child in whom the structures are softer, trying to breathe through a partially occluded nostril: this constant falling in therefore, alters the shape of the anterior nares and the cartilages tend to fall towards the middle line, thus causing narrowing of the nose. In the same way, constant blocking of one nostril more than of the other, as is often the case, will produce greater narrowing of the occluded nostril than of the other, and this condition, long continued in one in whom the structures are soft and not fully developed, leads to deviation of the septum, the diminished tension on the one side and the normal tension on the other soon resulting in the deformity.

I think, therefore, from what I have seen of the condition, that though the above named peculiarities may sometimes predispose to adenoids and by their presence make their symptoms more manifest, in the majority of cases they are the result rather than the cause of the development of adenoids. This opinion is backed up by the statements of various observers, e.g. Macleod Yearsley[11] says in relation to Parker's list of deformities: "I am strongly of opinion that in putting forward the above nasal abnormalities

(11) Yearsley Op. Cit.

writers have, in the case of most of them, confused cause with effect. Cleft palate and possibly the other palatal deformities mentioned may be excepted. I feel sure that in a very large number of cases the presence of deviated septum, enlarged inferior turbinals, small anterior nares, and contracted nasal fossae, is rather due to adenoids than that the adenoids are due to them." The same authority, quoting from Mayo Collier (Med. Press and Circ., Nov. 20th, 1895) says that he only found 110 normal noses in 1050 patients indiscriminately examined, and that from these data, it is extremely rare to find any nasal obstruction, unless due to temporary causes, under 10 years of age.

A. A. Bliss[12] also says that in his experience, in most cases of deflection of the nasal septum, there have been no adenoids. Certain constitutional diseases are said to predispose to the development of adenoids. Of these, the two most important are (1) tubercle (2) syphilis. Of my 50 cases, 7 had decided evidence of tuberculosis, generally in the form of caseating glands. That adenoids are strong predisposing causes to the development of tubercle I firmly believe, and shall deal with the matter later, but whether there is any connection between

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(12) Deflection of Nasal Septum in Children - Trans. of Amer. Laryn. Soc. 1905.

the tubercular diathesis and the development of adenoids is another matter. The pharyngeal tonsil forms part of the general lymphatic system, and in many tubercular children there is a tendency to lymphatic enlargement, and in this way probably the tubercular diathesis contributes to the formation of adenoids. But the unhealthy surroundings and the catarrhs of the subject of adenoids favour tubercular infection, and from its position, an adenoid mass would be one of the first places for the tubercle bacillus to settle.

Statistics as to the occurrence of adenoids in subjects of tubercular history are unreliable as it is just as common, if not commoner, to find tuberculosis developing in the subject of adenoids, as to find the latter condition arising per se, in the tuberculous.

Meyer, in his original paper, says that 'scrofula is one of the commonest aetiological factors'. But in this connection again, I think it is easy to mistake cause for effect, and in view of the great improvement I have seen after operation in children with adenoids who had developed tubercular glands, I think that most of those children who are weak, sickly and prone to catarrhs owe their condition to

adenoids, rather than their adenoids to the weakness, tubercular or otherwise, of their condition.

Syphilis has been stated to be a predisposing cause, and in this connection it is well to remember the tendency to catarrh, the snuffles, the very irritating mucus and the obstruction to the nose as much more likely to be the cause of the lymphoid hypertrophy than the actual diathesis itself. It is in this I think that the importance of syphilis lies as a cause of adenoids, as the constant irritation is sure to produce inflammation and overgrowth. Carpenter(13) says that snuffles is the commonest manifestation of syphilis in children, and may or may not be followed by adenoids.

Gout and Rheumatism are also said to be causes predispoding to adenoids, but I have never been able to establish any definite connection between the two, except that they probably act through the tendency they have to induce catarrh.

Regarding Cretinism, in which condition adenoids are said to be common, I have not had any personal experience, as my cases do not include any cretin, nor do I remember having noted adenoids in any cretin I have seen. Yearsley, in his work on 'Adenoids' says "the presence of adenoids in the myxomatous is

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(13) Syphilis of Children in every-day practice.

quite likely to be due to the general debility of such patients, and their occurrence in localities where cretinism is endemic may equally be due to the climatic and other conditions prevailing."

A very interesting view of the cause of adenoid growth is that put forward by Dr H. Campbell in the 'Lancet' of July 25th, 1903(14). He would explain the frequency of adenoids in the modern child as the result of the soft food given to it: he contends that the pappy nature of the food necessitates less mastication than there should be, the food is easily swallowed without being chewed, and as a result of this there is a want of the proper flow of blood and lymph which takes place through the posterior nares and naso-pharynx as well as other parts of the mouth when mastication is properly performed. He says "it is in this way that I would explain the frequency of adenoids among children of civilised communities. I claim in fact that this disease is largely dietetic in origin: I submit that a child whose nasal apparatus and naso-pharynx are well-grown and habitually bathed by a stream of pure blood and lymph, periodically accelerated by an ample and vigorous use of the masticatory muscles is unlikely to contract adenoids. On the other hand I contend that a child

(14) Observations on Mastication.

in whom these parts are all-developed and bathed by an habitually sluggish stream of tainted blood and lymph - one i.e. that is not only poisoned, but rarely if ever, hurried along its lazy course by due exercise of the muscles of mastication - I submit that such a child runs great risk of contracting the disease."

These observations I think are very interesting and appeal to one strongly. Without going so far as to say that the condition is mainly dietetic in origin, I have no doubt that if children were given food which required plenty of chewing and if it were seen to that they did chew well, their chances of developing adenoids would be much lessened for the reasons which Dr Campbell gives. We all know that children with adenoids tend to chew their food much less than they ought to, for the reason that they so often have great difficulty in breathing through the nose during mastication, and so are anxious to bolt their food and get it over, and among the many evils which result from this practice, we have this one of the want of muscular exercise in the mouth and the consequent tendency to stagnation of blood and lymph. Therefore, I am inclined to support the view to this extent that if any tendency to adenoids exists, it

will, to say the least of it, be favoured by this absence of natural and necessary massage and healthy action.

Of Exciting causes, probably the various catarrhs of the upper air passages are the most common. Twenty-one of my fifty cases gave constant cold catching as a prominent symptom, and several gave it, so far as could be told, as the cause, but here again the difficulty comes in of determining exactly to what extent the two are dependent on each other. These attacks of catarrh by inducing hyperaemia of the lymphoid tissue of the naso-pharynx and by often recurring produce in the end a permanent hypertrophy. Any one with a cold in the head has this swelling of the tissues of the nose and throat, but in the healthy and those not otherwise predisposed the hyperaemia passes off at the end of the attack and the parts return to the normal. But in children who are delicate and in whom the colds constantly return, or in those who have a tendency to lymphatic enlargement, or who are not attended to, the mucus being allowed to collect and irritate, the development of adenoids is very common. In them the catarrh tends to become chronic and when the adenoids are developed the tendency to take cold is

more increased even than before, a vicious circle thus being formed, the constant colds producing adenoids which in their turn tend to make the catarrhs more frequent and more chronic, until the adenoids become large and produce marked symptoms. These facts are well illustrated in many of the children who suffer from adenoids, as it is common to find them with ever-running noses and it is not difficult to imagine the irritation caused by the septic mucus in their post-nasal spaces, as it is equally pleasing to find the conditions clear up or vastly improve after operation. Thus catarrhs act by inducing a more or less constant hyperaemia, with resulting hypertrophy: by lowering the general health and by the secretion of irritating mucus, this last acting especially in those in whom the sense of cleanliness is not notably developed.

Exanthemata: several of my cases dated the commencement of their symptoms from an attack of one of the infectious diseases - scarlet fever, measles, or diphtheria, and these are important causes of the occurrence of adenoids. They are manifest in the nose and throat, where their respective organisms find an excellent nidus, the poisons being absorbed by the lymphatics of the various glandular masses

in that region, which in consequence become inflamed and enlarged: as in catarrhs, this inflammation sometimes resolves, sometimes leaves permanent overgrowth: also in all of these diseases there is a secretion of very irritating and septic mucus, which lends its aid as a factor of causation. Yearsley says that 'after colds these were the most prominent causes given in his 307 cases'. Twenty-six gave scarlet fever, and the same number measles: he found diphtheria as a cause in only 2 per cent of his cases.

Crowley[15] found that measles caused 40 per cent of his cases.

Parker[16] mentions an interesting case of a child who developed a septic sore throat which ran a very sluggish course with constant relapses: nasal obstruction developed, and there was great difficulty in respiration, especially at night: ear-ache occurred in both ears, the right one suppurating: on examining, the tonsils were found enlarged and there was a mass of adenoids: after the removal of both of these, recovery was rapid. He considers that diphtheria is an important cause. Whooping cough is also given as a cause in some cases.

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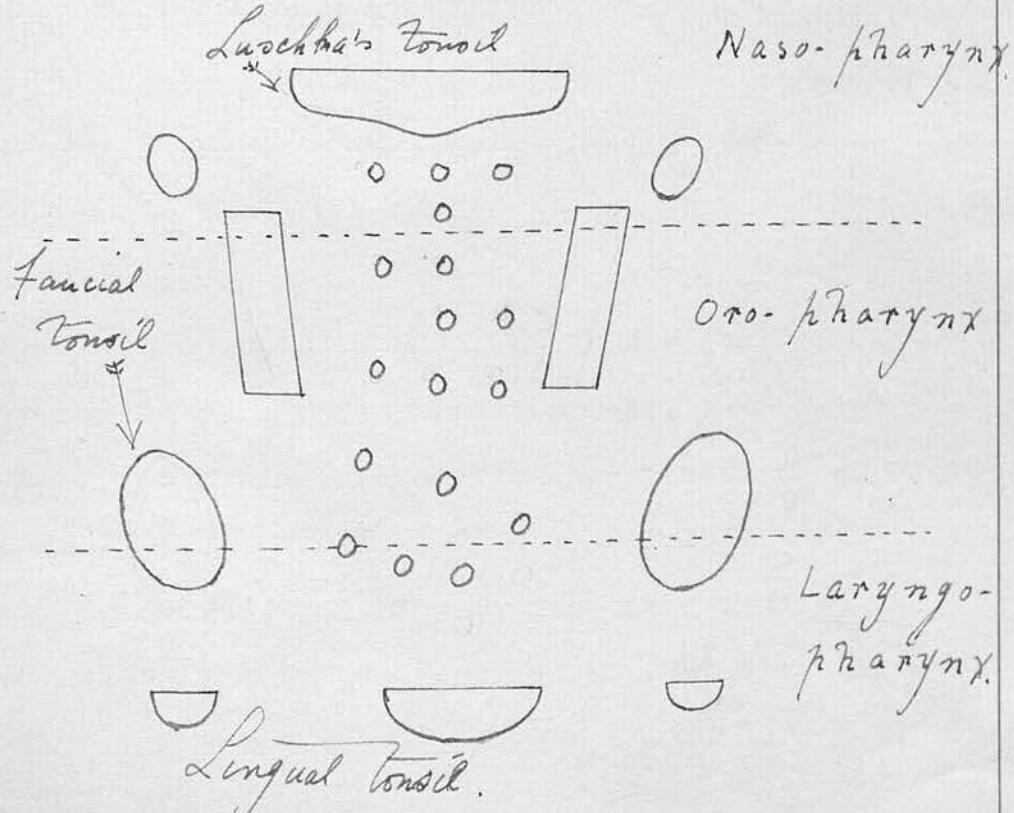
(15) Adenoid vegetations Pediatrics May 1st, 1897.
(16) Post nasal growths.

Carious teeth, by favouring the production of poisons in the mouth, also act as causes, the poisons being absorbed to a certain extent from the mouth and irritating during their absorption.

## ANATOMY AND PATHOLOGY.

Luschka's, or the pharyngeal tonsil, hypertrophy of which constitutes adenoids, is a structure normally present in the child. It is in reality a superficial lymphatic gland, analogous to the faucial and lingual tonsils with which it forms Waldeyer's lymphatic ring of which it constitutes the upper part



This ring is composed of the various lymphatic masses in the naso, oro and laryngo-pharynges, where they probably act as guardians of the portals.

Luschka's tonsil is situated on the posterior and superior walls of the naso-pharynx, extending from just behind the vomer and reaching well down on the posterior wall, but normally not visible from the mouth: laterally it extends from one fossa of Rosenmuller to the other, and according to some authorities on to the Eustachian cushions and even into the tubes. Some authors deny their existence in the fossae of Rosenmuller, but I have both seen and felt them in this situation: but I have never been able to make out prolongations into the tubes. In marked cases of deafness, it is common to find a considerable amount of growth in Rosenmuller's fossa often pressing on the Eustachian openings, and if the growth is large, sometimes extending right over them. The growth forms a mass of fleshy feel, and it varies in consistence from being soft and friable to fairly firm. When felt in position by the finger, it appears to be a soft irregular mass, into which the finger sinks, and which often has a sort of corrugated feel.

In adults, the growths, or their remains are generally firm to the feel, as by that time there is

a fair amount of fibrous overgrowth, which has caused shrinking. The best opportunity for seeing adenoids in situ is afforded in the case of cleft-palate: I have been enabled to examine them carefully in several such cases, and their appearance is quite characteristic. In other cases, the adenoids were examined after removal, as far as possible in one piece, with the curette. The size varies from a very small hypertrophy, barely meriting the name adenoid, to a mass which may entirely block up the naso-pharynx. In colour it is generally pale pink, matching the continuous mucous membrane of the pharynx, and it is often to be seen covered with slimy mucus. The growth is sessile, the main mass being in the upper part of the naso-pharynx, and generally extending laterally in the directions mentioned above.

Schaffer (quoted by McBride and Turner)[17] says that pedunculated growths seem to be more frequently met with in certain parts. I have never had the opportunity of seeing any of these, all the growths which occurred in my experience being sessile. The tonsil is divided into two parts, an anterior and a posterior by a more or less well defined groove, called the 'recessus medius', and the two parts are

(17) E.M.J. April, May and June, 1897.

further sub-divided by smaller grooves, into a series of ridges, which are generally well marked in the hypertrophied tonsil. These grooves are important pathologically from the fact that cysts may form inside them, the epithelial layers in contact with one another becoming adherent from injury or inflammation, and they may either form a tunnel or a completely closed sac, containing mucus and debris, which, becoming contaminated by organisms, may form an abscess or may give rise to cheesy accumulations, giving the breath a foul odour. In one of my cases a cyst had formed in this way, about the size of a pea, containing mucus and cheesy debris.

Histologically, the tonsil is composed of a superficial layer of ciliated columnar epithelium, which is continuous with the lining of the upper respiratory passages: four or five layers of smaller cells, a basement membrane, mucous glands and the gland substance proper, consisting of fibrous septa giving off fine branches, which ramify in all directions, forming a network of connective tissue, in the interstices of which lie the leucocytes. The septa carry the blood vessels and lymphatics to and from the gland which drains into the nearest cervical glands. Germ centres are also present: they are

rounded or ovan-shaped groups of cells, which are darkly stained at the margin and paler in the centre. The mucous glands are made up of ramified tubes lined with columnar epithelium, and they open into the crypts. I have microscopically examined sections of 10 different adenoid growths with a view to studying their histological structure. The specimens were all removed from my patients without regard to the symptoms or size of the growth or age of patient. They were hardened in saturated corrosive sublimate solution and sections were kindly cut and stained for me by Mr Richard Muir. The epithelial covering shows interesting variations in structure. Normally it is of the columner ciliated type, and in many parts of the sections this is shown, covering the outside of the gland, and dipping down into the crypts. In other parts, however, the cilia are removed, probably from pressure, either on one side of a crypt against the other, or of the whole mass against the posterior nares during deglutition: changing still further, some parts show a total disappearance of the columnar type of cell and the development of a thick layer of stratified squamous cells: this is probably produced in the same way as the above, by pressure in the naso-pharynz, leading

to thickening of the epithelium: it is found on the surface only, in my specimens, none of this type showing in the crypts. Fig.I. shows the condition

Fig. I

in a section of growth from a boy of $2\frac{1}{2}$ years. MrBride and Turner[18] conclude that this change of type is due to pressure of the growth in the smaller naso-pharynx of the child from the fact that it occurred only in their younger cases, all being under 10 years except two who were 12, and on the other hand, sections from patients of 15 years and upwards,

(18) Op. cit.

with one exception, showed no thickening of the epithelium. They also quote a paper of M. Brindel's on the histological examination of 64 adenoid vegetations, in which this point was discussed, and he finds also that it occurs in his youngest patients.

In other parts of the growth the epithelium has thinned away, in some places to complete disappearance. This may arise either from the mutual friction of two parts of the growth, or from the pressure of accumulated secretion in parts where the adjacent surfaces have adhered, as in Fig.II. in which all the stages may be seen from loss of the cilia to thinning and disappearance of the epithelium.

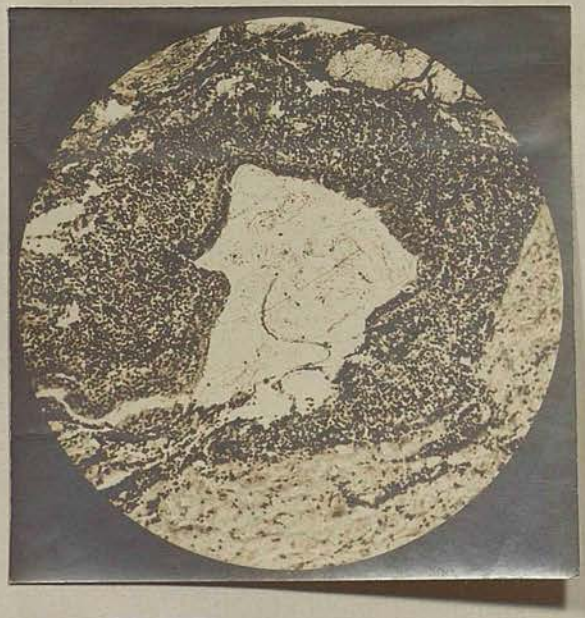


Fig II

This loss of epithelium is very important from the point of view of infection of the adenoids with various micro-organisms, as with the absence of cilia which help to remove them and with increased facility for abrasions of the surface occurring, they will find less hindrance to their entrance and development through the weakened defences.

As is mentioned above, adenoids may be firm and hard, or very soft in consistence, the difference depending on the amount of fibrous tissue present. This is well marked in many of the sections, the microscopic appearance corresponding to the firmness of the growth.

The difference is shown in Figs.III. and IV., which show respectively a hard and a soft form of growth.

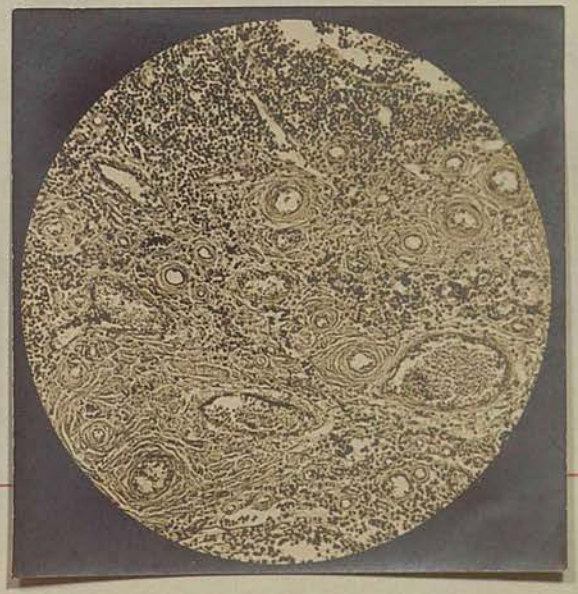
Fig. III

Fig. IV.

The practical importance of this is that we cannot depend on the adenoids disappearing by sclerosis at puberty: they may or they may not do so, and the result is quite as dependent on other causes as on the growth of fibrous tissue, for in the larger naso-pharynx of the adult the adenoid mass will not prove such an obstruction to respiration as in the child, whose naso-pharynx the growth may completely full up, and obviously therefore, the suction on the mass during inspiration which is marked in the child, will probably be very slight or entirely absent in the adult.

The fibrous tissue overgrowth does not depend on the age of the patient, as marked sclerosis is often found in quite young children. Fig.III. is from a patient aged 8 years: Fig.IV. from one of 24. McBride and Turner[19] found sclerosis present is 50 per cent of cases under 7 years. They also found that it had advanced to a greater extent in a child of 3 years than in any other patient. From their analysis they conclude that the development of fibrous tissue takes place in the substance of the adenoid hypertrophy, commencing round the blood vessels, as a perivascular sclerosis, invading the lymphoid tissue and replacing it. This process is independent of the age of the patient and is not one that necessarily commences at or after puberty, but may occur at all ages, and be even more marked in the very young child than in the adult.

Fig. V.



(19) Op. cit.

The leucocytes lie in masses enclosed by the fibrous septa and from there they either pass via the lymph stream into the blood, or emigrate on to the surface where they assist in destroying the organisms which lie entangled in the mucus. When the superficial epithelial layer is thickened from intermittent pressure or other causes, this emigration takes place with greater difficulty, or not at all, and this is very important from the point of view of infection of the gland from the outside. The lymphatics from the pharyngeal tonsil drain into the superficial cervical glands, which receive their afferent vessels from the external and internal head, their efferents emptying into the deeper group: some of the lymphatics, however, pass directly to the deeper group of glands. These facts are illustrated clinically by the frequency with which the glands are enlarged in cases of adenoids, and the gland which is usually to be found enlarged is one of the deeper group, which lies external and slightly anterior to the internal jugular vein, and is evident when enlarged, as pushing forward so as to be easily palpable at the anterior border of the sterno-mastoid muscle. In nearly all of my cases this gland was felt to be more or less enlarged,

and in 13 of them the superficial glands were markedly enlarged. They show the importance of the pharyngeal tonsil as a path of injection in various diseases, and this is notably the case in regard to tuberculosis. None of my sections, unfortunately, show evidence of tuberculous infection, though the glands in many of the cases were undoubtedly tubercular: the sections were not stained for bacilli, but none of them show evidence of giant-cell formation. McBride and Logan Turner(20) found evidence of tubercular infection in 3 per cent of the sections which they examined for that purpose. Their evidence consisted of the presence of giant-cells, but they found no caseation and no tubercle bacilli. But for they very great difficulty in detecting tubercle bacilli in tissue, it is probable that the percentage would have been higher. They also quote the results of other workers in this field: Pilliet found giant-cell systems and caseous degeneration, but no bacilli in 7.5 per cent out of 40 cases. Lermoyez gave evidence of tuberculous infection in two cases. Dieulafoy found that 20 per cent of the cases he examined (35) were tubercular, and Gottstein found 12 per cent. In addition to tubercle bacilli, large numbers of other organisms have been demonstrated on the surface of adenoid masses and in the

(20) Op. cit.

crypts. McBride and Turner found that these were chiefly micrococci, short bacilli being however also present, and in one case the leptothrix buccalis. Thus it is shown that the hypertrophied pharyngeal tonsil is a potent source of danger and infection, favouring the lodging of micro-organisms and giving increased facilities for their introduction into the system.

## SYMPTOMS AND COMPLICATIONS.

The symptoms of adenoids range in number and severity from nil almost to legion, and there is no doubt that they play a large and important part in the illnesses of childhood. That this must be so is evident from their position at the upper part of the respiratory and alimentary tracts, where interference with either of these functions must tell considerably on the health and development of the subject, not only from their immediate effects, but from the many complications they are answerable for. When a child, the subject of adenoids, is brought for examination, it is often easy to tell at a glance what the nature of the condition is. The open mouth,

projecting teeth, pinched nostrils or sometimes broadened nose, and general appearance of lassitude are quite characteristic: not every case of this description is the subject of adenoids, as other forms of nasal obstruction may give rise to a similar appearance, but as a rule, almost every case will be found to be adenoids, so much so, that the term 'adenoid face' has been given to faces of this description, though to be more exact, I think that 'nasal face' is better, as it is the obstruction in the nose whether adenoidal or not, which is the cause of the appearance.

But it is not every child with adenoids that presents the typical appearance, for as we may have the nasal face without adenoids, so we may have adenoids without a nasal face. In fact, as pointed out by De Champeaux, we may have the three groups -

(1) Adenoids with adenoid face.
(2) Adenoids without adenoid face.
(3) Adenoid face without adenoids.

So far as my own experience goes, the first of these is the commonest, as I found it was generally possible to find some evidence in the face, of the existence of adenoids, and this is to be expected in practice, as by the time a child is brought for

consultation, the mass has generally grown enough to cause obstructive symptoms.

The second class is fairly common, and I think, is to be explained by the fact that in these cases, the obstruction to nasal respiration is not great, the growth being either small in comparison with the cavity which contains it, or being low down in the cavity, so that air passes readily in front of it through the nose.

On the third class I have not had opportunity of examining many, but have found those I have seen to be due generally to nasal polypi, or to a deflected septum, and in one case, to what could only be put down as a congenitally narrow nose.

The principal characteristics of the adenoid facies are as follows (see Figs. VI. and VII.),

Fig. VI

Fig. VII

the nose may be either pinched and thin or it may be 'snub', with a marked dimple on either side.

Fig.VI. shows the broader, snub type in a child of 6 years: she suffered from snoring, slight deafness, 'adenoid speech' and constant colds: she breathed through the mouth, which was dry, with carious teeth: she had a fairly large pad of adenoids in her naso-pharynx. Fig.VII. is a photograph of a boy of 5 (both photographs I took at the Sick Children's Hospital, Newcastle-on-Tyne), who showed the narrower and more pinched type of nose: he was a mouth breather, and suffered from occasional deafness, his drum membranes being indrawn: he also had facial twitching and the superficial cervical glands were enlarged. As a rule, the nose is narrower than usual, especially in its lower part, the nostrils appearing pinched and sharp: the bridge is often broadened and flat-looking, but, as mentioned above, some noses are entirely of a 'squat' shape. The nasal dimple is well marked just above the alae, between the superior and inferior lateral cartilages, adding to the pinched appearance of the nose: it can often be seen to increase or decrease as the patient attempts to inspire or expire through the nose. In addition, the edge of the nostril, and middle

part of the upper lip are often thickened, and in an excoriated or eczematous condition, owing to the irritating mucus which in many cases constantly bathes them: this running nose is very common in cases of adenoids, the excess of mucus being secreted by the hyperaemic and over-active mucous membrane of the nose, and containing abundance of micro-organisms and other particles of irritating matter.

The interior of the nose may show hypertrophic rhinitis, with swelling of the turbinals.

The causes of this alteration in the shape of the nose are two in number:-

(a) Suction, acting on the comparatively soft structures.

(b) Atrophy, resulting from want of use, and non-entrance of air.

The effects of suction are best seen by watching an adenoidal child while it is sleeping, for then the natural instinct to breathe through the nose comes into play. The child attempts to breathe through the nose, but owing to the difficulty of the entrance of air past the obstruction, a partial vacuum is produced, the result being that the soft, plastic parts tend to fall in: the alae are drawn towards the middle line, and the point between the superior and

inferior lateral cartilages, constituting the nasal dimple, becomes well marked. I had a good opportunity of observing this action taking place in a sleeping child of 7 years, whom I saw on several occasions: he suffered from adenoids, but not to such an extent as to make breathing through the nose impossible: he was operated upon, and after the swelling and discomfort consequent upon the operation had passed off, he breathed easily through the nose and the effects of suction disappeared. This cause comes into play chiefly at night, and its occurence for 8 or 9 hours out of the 24 is a potent factor in the ill-development of the nose. During the day, most of the older children who suffer from adenoids breathe through the mouth, either entirely or they attempt every now and then to breathe through the nose and finding difficulty in doing so, use the mouth to help them. In younger children the instinct to breathe through the nose is great and they have not the sense to breathe through the mouth, so the deformity as it develops can be readily seen in them. The mechanism is also easily demonstrated if one has a cold in the head with one nostril more blocked than the other: if the freer nostril is blocked by the finger and an attempt made to breathe

through the other, the ala nasi is seen to be drawn in, and this occurring more or less constantly in the subject of adenoids, in whom the tissues are easily moulded, soon results in the production of the deformity.

The other factor in the production of the adenoid nose is want of use. It is a physiological law that organs which are not used tend to atrophy and this occurs in the nose when the posterior nares is blocked. To what extent the mal-development of the nose depends on this it is hard to say, but I believe that the falling in due to attempts at nasal breathing is the more important cause of the two.

Yearsley[21] explains the production of the adenoid facies as follows: - "the adenoid type of face results from a failure of equal development between the upper and lower parts of the face, which explains the presence of the adenoid face in those in whom the growths are absent, nasal obstruction from other causes bringing it about. This atrophy of an organ which is not used (the nasal fossa) perfectly accounts for the adenoid face in those who have adenoids."

All cases of adenoids, however, do not have the adenoid facies, and this is due to the fact that the

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(21) Op. cit.

adenoids do not cause obstruction to nasal respiration in these cases. If the patient can breathe through the nose, the two factors in the production of the fallen-in nose are absent - there is no partial vacuum produced and the organ is used. This condition we get if the adenoids are small and the naso-pharyngeal space proportionally large, or if the main mass of adenoid tissue lies below the posterior nasal openings. The amount of obstruction depends not so much on the actual size of the adenoid growth as on the relation between its size and that of the naso-pharyngeal space, for a comparatively small mass may produce great obstruction in a young child, and in older children, or in adults, large masses may be found, which cause no nasal obstruction. The appearance of the mouth is also fairly characteristic, and adds greatly to the appearance of stupidity which these patients present. It is generally slightly open, as in Figs.VI. and VII. at first to allow of buccal breathing, then through habit and from want of tone in the muscles and ligaments of the jaw. The teeth are often crowded together and the palate arched. This was very well exemplified in a case of mine, of whom unfortunately I could not get a photograph: she had a highly

arched palate, with a narrow jaw and crowded, irregular teeth: she also suffered from attacks of asthma, and had a large mass of adenoids: the mouth was kept open and the nose was rather broad at the bridge with pinched nostrils, and her whole physiognomy was characteristic of adenoids. Sometimes the front teeth project and give a heavy, thickened appearance to the upper lip. From the buccal breathing and consequent drying of the mouth, to say nothing of the inhaled particles, the teeth are generally covered with tartar and decay easily. The drooping of the lower jaw also gives the appearance of downward and backward displacement of the chin, making it look as if it were ill-developed.

The relation between the highly arched palate and the 'adenoid' or 'nasal' face appears to be developmental rather than one of cause and effect. To quote from Jonathan Wright, of New York(22), "some years ago, E. Fraenkel, by careful measurements, came to the conclusion that this configuration of the jaw occurs no more frequently in those who have than in those who have not had post-nasal hypertrophy. Indeed, Lange had stated, and it has been my experience, that cases of a very high, narrow palatal arch are not infrequently seen without a trace of adenoids.

(22) Yearsley Op. cit.

According to Grossheintz, the existence of this condition depends upon the type of skull - whether, in other words, it is dolicho-cephalic or brachio-cephalic." Wright concludes "while it seems very evident to me that adenoids as the cause of narrow jaws, have been a subject in which very erroneous ideas have prevailed, I am not convinced that the narrow jaw, on the other hand, does not have some aetiological influence upon the occurrence of lymphoid hypertrophy in the vault of the pharynx. We may presume at least that adenoids, occurring in such subjects, are very much more apt to produce symptoms, especially of obstruction, and thus more frequently come under the observation of the physician than do those of the brachio-cephalic type: but even this assumption should not be too absolutely entertained in the face of the extensive measurements and careful observations of Fraenkel and Grossheintz."

The eyes of the subjects of adenoids are often expressionless and dis-interested looking, and there is sometimes a peculiar raising of the lower eyelids, which gives the appearance of sleepiness and want of intelligence - as is shown in Fig.VI.

Speech. The 'adenoid' speech, or as it might be termed, like the facies, the 'nasal' speech, is also characteristic and commonly observed, and was present in a large number of my cases, though I did not note the exact proportion of them that showed it. It is the sort of speech which is familiar to most of us as that heard from sufferers from cold in the head: there is a want of resonance in pronunciation, and it is especially marked when the letters "m", "n", or "ng" are used. On asking the patient, for instance, to say 'common', he pronounces it as 'cobbod'. This again is due to nasal obstruction, the air which should pass partly through the nose when those letters are pronounced having to pass entirely through the mouth; but it is a more common symptom than the buccal breathing as a smaller amount of adenoid hypertrophy is capable of interfering with the air vibrations which pass along the naso-pharynx when those letters are phonated.

The voice also gets tired sooner than it does in normal people, especially in older children who have to make their voices heard as they have to shout more to make up for the lack of resonance. The tiring is also probably in part due to the gereral lassitude and incapacity for exertion in these

patients. Although it is beyond what is strictly the scope of this paper, I may cite an example which came before my notice in the case of a school-teacher, who, besides other symptoms, complained decidedly of this tiring of the voice at her work: she had enlarged tonsils, and a firm pad of adenoids, but unfortunately I had not the opportunity of treating her surgically, though I am certain that removal of the offending masses would have benefited her.

In connection with the effects of adenoids on speech, it is well to take the condition of 'stammering' or 'stuttering'. None of my cases exhibited this sympton, so I can give no experience of my own on the matter. Other observers seem to differ as to the connection between the two, but the majority seem to favour their interdependence, and considering the many reflex effects which may be caused by the presence of adenoids, and the results of treatment in the cases quoted by various authors, I do not think that there is much doubt that such defects of speech may in many cases be cured or alleviated by the removal of the growth. McBride and Turner doubt whether the conditions stand to each other in the relation of cause and effect, and have difficulty in believing that stammering is often, if ever, produced in this way.(23) Yearsley(24) however believes

(23) E.M.J., April, May and June, 1897.
(24) 'Adenoids'.

that they are frequently interdependent. In his 307 cases, stuttering was marked in two (a male and a female) and in both cases the symptom was greatly improved by removal of the adenoids. He also mentions another case of a lady with a large pad of adenoids who suffered badly from stammering, and who improved immediately after operation and was cured entirely in a month during which she had speaking lessons. Mygind[25] gives the proportion of stammerers who have adenoids as 39 per cent. Block[26] also lays great stress on the association of mouth breathing with stuttering. Parker[27] says only that stammering is sometimes found with adenoids and sometimes cured by their removal: to him the relation is not obvious. Hall and Tilley[28] state that stammering and stuttering have in several cases been completely cured by the removal of adenoids. Thus it will be seen that the evidence is not unanimous, but is strongly in favour of the two being connected as cause and effect.

Snoring at night is a very common symptom, occurring along with restlessness, disturbed sleep, and often enuresis. Of my 50 cases, 18 made complaint of this symptom, and probably the number was really

(25) Yearsley 'Adenoids'.
(26) Osler 'Practice of Medicine' 1905.
(27) Post Nasal Growths.
(28) Diseases of the Nose and Throat 1901.

larger, as when asked about it, many of the parents said they did not know - they had not noticed it. It varied in intensity from slight difficulty in breathing, with occasional snoring sounds, to deep well-marked snoring with great obstruction to respiration and much disturbed sleep.

It is due to obstruction of the posterior nares and to the instinctive attempts to breathe through the nose, these being all the stronger during sleep when the patient's will does not come into play to bring about buccal respiration. It shows how strong is the instinct to breathe through the nose if possible when we think of or watch the discomfort and restlessness of the little sleeper, or the deep sleep of partial asphyxiation which is succeeded by disturbing dreams and a sudden awakening, all of which could be saved if only he would breathe through the mouth. And this occurs too in cases who sleep with the mouth open, as they attempt to breathe through the occluded nose rather than through the mouth. These facts could all be seen by watching a case of mine, A.S. aged 7, who suffered from adenoids and was a mouth-breather: at night I have watched him sleeping, with his mouth slightly open, snoring loudly. On holding a piece of cotton-wool before

the mouth and another before the nose, only the piece before the nose was observed to move backwards and forwards during respiration, thus showing that the air all passed in through the nose, though there was a convenient channel in the shape of the open mouth. The snoring in this case was succeeded by disturbed sleep, as he tossed and turned, and almost every night he was wakened by terrors, and he had great difficulty in being pacified. During the day he sometimes breathed through the mouth, sometimes through the nose, but at night he always attempted to use the latter passage, with the above results. The few other cases I had the opportunity of observing during sleep, showed a similar condition of affairs, some sleeping with the mouth shut, others with it open, but nearly all attempting to breathe through the nose. In the case of a baby it was most distressing to watch as the difficulty in breathing was extremely marked, the anterior triangles of the neck, and the lower ribs being strongly drawn in, and the sleep being very disturbed. In this case the tonsils were considerably enlarged also, and breathing occurred mainly through the nose, but partly through the mouth as well: removal of adenoids and tonsils was followed by a most happy result, and his nights after that were peaceful.

Parker(29)examined 50 cases in regard to nasal or buccal respiration in connection with snoring. Of these he found that 43 patients kept the mouth open during sleep, 6 kept it closed, and 1 had it sometimes open and sometimes closed. Respiration was entirely nasal in 41, entirely buccal in 1, and partly nasal, partly buccal in 8. Snoring occurred in 14, noisy breathing in 27, quiet breathing in 9. There was recession of the anterior triangles of the neck and other yielding parts in 13, showing the obstruction to the entrance of air. In his experiments he used a film of cotton wool, which when held over the nose or the mouth, showed by its movements whether air entered and returned or not. These experiments are very interesting as showing the strong tendency to breathe through the nose, even in the face of such obstruction as caused snoring and heavy breathing, and they also show that snoring is caused in breathing through the nose, not in breathing through the mouth, or at any rate, that it is chiefly in the former passage that it is produced.

It is not difficult to understand that the results of this obstruction to breathing are very distressing and very important. Instead of resting quietly and sleeping soundly, the child's sleep is a

(29) Op. cit.

mixture of constant effort to draw in air, and great restlessness as a result of these efforts and their futility. The efforts at drawing in air are well seen in the falling in of the nose, the recession of the anterior triangles of the neck and the sucking in of the ribs, especially in their lower and more yielding parts. The sleep is some times very deep, the child being partly asphyxiated by the venous condition of its blood, and then he either wakens with cries of terror at his had dreams, or he constantly tosses about, half wakening and taking a breath or two through the mouth and then returning to his disturbed sleep again. The consequence is that night after night the sleep is disturbed, and his health suffers as a result. He is languid and headachy in the morning, with impaired appetite and disinclination for exertion, and, if he is at school, with inability to pay attention or do work of any kind properly. This was complained of in several of my cases, parents saying that their children snored and slept badly at night, and that they were quite unfit for work during the day and had to be constantly kept away from school. In these cases, the result of the removal of the adenoids is generally most gratifying.

Another symptom which is associated with the restlessness during sleep is nocturnal enuresis. Of my cases six gave this among other symptoms and it is noteworthy that they were all sufferers from the effects of obstructed respiration at night, snoring or breathing heavily and being restless in their sleep. For example, a well-marked case, W.S., 8 years old, suffered badly from disturbed sleep and nocturnal enuresis: he was a weedy-looking, flat chested boy, with disinclination for any exertion: there were no preputial adhesions, and no local cause for the enuresis, which was of nightly occurrence, but he had a large mass of adenoids, which was removed. Three days after operation his sleep was much quieter and he had practically no difficulty in breathing through the nose: after careful training the enuresis lessened and finally stopped in six or seven weeks.

Another case, J.B., age 5, suffered from enuresis at night and from snoring and choking during sleep: the adenoids were fairly large and both tonsils were also hypertrophied. Operation gave relief to his breathing, but the enuresis continued occasionally for about three weeks, and then gradually stopped altogether. Other cases did not show

so favourable a result, but I think that in most of them there was a local cause acting as well, in the shape of a tight prepuce or adhesions: some, no doubt, depended merely on the continuance of the bad habit, of which they were unable to break themselves, or their parents' encouragement was not on the right lines.

The cause of the enuresis has been put down to either deficient oxygenation or to a form of night terror, and is probably connected with the impeded nasal respiration(30). Weight is given to this idea in my cases from the fact that they all occurred in those in whom the breathing was difficult and laboured. It is also well exemplified in a case of Gronbeck's (quoted by Yearsley): this case was considerably improved after operation for adenoids, but the enuresis returned whenever he caught cold. Gronbeck examined 235 cases of adenoids, of which thirty-five, or fifteen per cent, had nocturnal enuresis. Four stopped spontaneously: seventeen were completely cured after operation, one considerably improved, and in two there was no improvement: no results were noted in the case of the remainder of the thirty-five. Yearsley only found three marked instances in his 307 cases: two of them were

(30) M'Bride and Turner Op. cit.

cured fourteen days after operation, and in the other, the result of operation was not noted.

Hall and Tilley (Diseases of the Nose and Throat) mention also two cases in which the enuresis stopped permanently immediately after the removal of adenoids.

Dreaming, night-terrors and nightmare are very common, and occurred in 15 of my cases, and, like the cases of enuresis, they were all sufferers from obstruction to breathing during sleep. The common description given was that the child started out of sleep, crying out and looking frightened and bewildered, and one case used to complain that he was choking. In another case, which I saw two or three times during an attack, he used to scream and shout in his sleep, which was always restless, and on being taken out of bed, used to kick and shout until he was properly wakened up, when he could be pacified. These attacks generally occurred three or four times a week, and considering that he was one of four who slept in the same room, with door and window closed and a large fire on, it is almost surprising that with his adenoids, he did not have them more often. His parents appeared to take them as a matter of course, but fortunately, happy results attended operation and removal of the mass, as he seldom had the

terrors after that, though I could not persuade them to sleep with the room in a more hygienic condition.

An admirable and vivid description of night-terrors is Kinglake's, on his own experiences as a child: it is quoted in Yearsley's book, and gives such a good idea of the form the terror sometimes takes that I should like to make note of it. The passage occurs in 'Eothen'. "When I was very young (between the ages, I believe, of three and five years old) being then of delicate health, I was often in time of night the victim of a strange kind of mental oppression. I lay in my bed perfectly conscious, and with open eyes, but without power to speak or move, and all the while my brain was oppressed to distraction by the presence of a single and abstract idea - the idea of solid Immensity. It seemed to me in my agonies that the horror of this visitation arose from its coming upon me without form or shape - that the close presence of the direst monster ever bred in hell would have been a thousand times more tolerable than that simple idea of solid size: my aching mind was fixed and riveted down upon the mere quality of vastness: and was not permitted to invest with it any particular object. If

I could have done so, the torment would have ceased."

Other dreams, and the most usual, are that the child is being suffocated or choked, and visions which arise are generally to match this idea, which is evidently the direct result of the difficulty of breathing and the venosity of the blood. In themselves, these dreams, from the effect they have on the child's nervous system, as well as from the part they play in disturbing sleep, are strong indications for the removal of the growth which is the fons et origo mali.

Adenoids do not, however, always cause disturbed sleep: on the contrary, sleep is sometimes very deep - more so than is normal, and this I think is due to the fact that in these cases the amount of obstruction is slight - enough to prevent a very free entrance of air, but not enough to cause the blood to get markedly venous, and thus the oxygen intake is just too little, but not to such an extent as to cause distress and disturbance, and so the child is asphyxiated to a very slight extent.

While on the subject of disturbed sleep, mention should be made of <u>somnambulism</u> as a result of adenoids. In none of my cases could I elicit this symptom, so have no practical experience of it to show, except that it evidently appears to be a less

common symptom than many others. One of Yearsley's cases suffered from somnambulism, but an operation was refused, so how far it depended on the adenoids could not be shown. I think, however, that it is quite likely that adenoids might be a cause of somnambulism, as that is what might be defined as an acted dream, and it occurs when sleep is deep and heavy. But in the absence of any definite information on the subject, I cannot say whether there is any connection between the two or not.

The mental condition of the subjects of adenoids is one of great interest, as well as of great importance. The principal feature of the effect of adenoids on the mental capabilities of a child is that to which Guye of Amsterdam gave the name of 'aprosexia', which means the defective power of fixing the attention. It is a very common symptom in these children, and it occurred as a marked symptom in 12 out of my 50 cases: from the appearance of several others of the children I should have said that the number was larger, but in many cases I could not get the mothers to admit the fact: in some cases they probably did not notice it: in others I have no doubt, a certain 'family pride' prevented them from admitting that any child of theirs was below

the normal standard of intelligence. Some parents, however, took a more sensible view of the case, and not only remarked on the symptom, but said that they noticed it but thought it was rather due to the child's deafness and that he could not properly catch what was said to him: others again put it down to the delightfully vague term which one so often hears, namely 'just weakness', and I am inclined to lend a certain amount of favour to their view. This leads us to the causes of this complaint, and these I think are several in number and act in different ways. Before entering into the causes, however, it would be well to sketch the nature of the complaint and give one or two illustrations. The usual story is that the child in the morning is rather listless and has not much appetite for breakfast: he goes to school, however, but is constantly brought to book (more or less forcibly) for inattention: probably after lunch, he finds the day's work too much and drops off to sleep, or if he manages to keep awake, it is with an effort and he has absolutely no energy for lessons. If set to any task the attention wanders and cannot be kept on the subject before it, and he goes home from school generally tired out and unwilling to join in the games of his fellows.

Such a case came under my notice in practice, and I take it as an example, because 'aprosexia' was the only complaint which her mother mentioned when she brought her. It was the case of a girl, M.R., age 10: the description given just above tallies almost exactly with her symptoms, which her mother found so bad that she generally kept her away from school at least two days every week: she was quite unfit for any attempt at home lessons, and she also slept badly, and suffered from occasional deafness. She was a thin, weedy-looking girl, with a marked pigeon-breast and the typical adenoid face: she also constantly took colds. On examination I found a large mass of adenoids and the tonsils were also slightly enlarged. She was operated upon and sent away for a change of air for a month. When she returned, she already looked a different girl, having nearly lost the down-in-the-mouth expression and being much brighter and more active, and when she returned to school her education progressed rapidly. The condition is probably due to a variety of causes - the disturbance of sleep at night, deficient aeration of blood and the general listlessness and want of tone resulting therefrom, requiring no great effort of imagination to connect them with the symptom, as it

is evident that if a child suffers from these conditions at night he is unlikely to do justice to himself in the morning.

But these are not the only causes. It is the common experience of sufferers from coryza that while they have an attack, the mental energy is much less than usual and so the feeling of discomfort and stuffiness in the head which arises in a condition which, for the present purpose, may be fairly compared to a chronic bad cold, is probably responsible for the symptom in a good number of cases, and I think that the degree of aprosexia depends largely on the amount of obstruction which is present. Out of my 12 cases which complained of aprosexia, 7 also suffered from difficulty of breathing and of snoring at night, with its train of accompaniments. Deafness, as hinted above, is also responsible for a number of cases, and occurred in 5 of my twelve cases, these not suffering from any marked obstruction to breathing. It is quite understandable that a child who only catches an occasional word of what is said, should let his attention wander, and, as I said, this was noticed by the more intelligent mothers, who said that if the child was spoken to so that he could hear, his wits were evidently quite sharp enough.

Another cause is that mentioned first by Guye of Amsterdam[31], and favoured by continental writers namely that it is due to obstruction in the lymphatic channels in their course from the brain through the nasal mucous membrane, with consequent congestion in the sub-arachnoid space.

From the cases and the results of treatment I have seen, I am inclined to the view that the most important causes of this symptom are discomfort in the nose and the constant effort to breathe, weariness as a result of disturbed sleep, and general want of tone, and largely, deafness; probably the cause put forward by Guye is also a potent one, but it is much more difficult to verify and is not so obvious as the others.

The difficulty in breathing entirely through the nose which occurs with adenoids among other causes is of great importance, as it affects children at the breast. While they are sucking, breathing should take place through the nose, but when that is occluded, partially or entirely, the child has to desist every now and then from drinking to take breath: this spoils its temper and disturbs its feed, and the result on its growth and nutrition need hardly be stated. Any state of the nose which causes this condition of affairs should of course be promptly treated.

(31) Barr 'Diseases of the Ear'.

Mouth-breathing is a symptom of great importance, and it is safe to say that a very large number of evils may arise in consequence of it. "There is more than a grain of truth in the aphorism 'shut your mouth and save your life', which is found on the title page of Captain Catlin's celebrated pamphlet on mouth breathing"(32). It occurs at first only occasionally and as the child feels the great necessity for it: then it becomes a habit, useful so far as the entrance of air is concerned while the obstruction in the nose is present, but a potent source of other evils: and it is a habit which tends to remain when the obstruction is removed. It is a very common symptom when the adenoid mass is large enough or so placed as to render nose breathing difficult, and it occurred in a majority of my cases, though I did not make a note of the exact proportion of them who were victims of the habit. It is a potent source of evil. In the first place, the inspired air is not warmed as it is when it passes through the chambers of the nose. Experiments by MacDonald and others have shown that the inspired air is warmed and moistened in passing through the nose, and in cold weather it may be warmed as much as 30°. The passing, therefore, of this cold and

(32) Osler 'Practice of Medicine' 1905.

more or less unmoistened air down the respiratory passages dries the secretions on them and renders them much more liable to be attacked by the ever-ready micro-organisms, besides adding to the discomfort of the patient. In addition to this, it has been shown that there are few or no organisms at the back of a healthy nose, which are not caught in the mucus when they enter, and destroyed by the leucocytes(33). When, however, breathing is carried on through the mouth, the secretions are dried and caked, and, with the various epithelial cells, form an excellent nidus for organisms, which accordingly flourish, giving rise to dental caries, and when swallowed, to various digestive troubles, not to mention other evil effects of their growth and multiplication, and the absorption of their toxic products, as "this state of oral sepsis depending on adenoids is important from the point of view of the mouth being the chief channel of the entrance of pyogenic organisms, and as itself the seat of septic processes"(34). Fetor of the breath is also likely to result from the same cause: this is especially the case when there are cheesy accumulations in the crypts.

By the inhalation of cold, dry air, the lining of the upper air passages is in excellent condition

(33) Bronner 'Brit. Med. Journal' Jan. 28th, 1905.
(34) Osler. Op. cit.

for the development of disease, as it is kept in a constant state of depression and chronic inflammation, the organisms and particles of irritating matter finding a favourable opportunity for producing mischief.

Further, if the tonsils are enlarged as they so often are, and to a considerable extent, even by mouth breathing sufficient air does not enter, so that we have added the excess of C $O_2$ in the blood and the results from that, which have already been enumerated. The instinct to breathe through the nose is, however, very strong, especially in younger children, and if the mouth-breathing habit is not allowed to continue too long, it is soon broken off after the adenoids are removed. Evil as the habit is, it is a shame to force the mouth shut, or to fasten it with plaster at night, as is sometimes done, while the adenoids are present, as it greatly increases the danger of suffocation, and children may even be killed by it.

A distressing symptom of adenoids is the occurrence of Headache, which is frequently met with. I found it as a marked symptom in only 2 of my cases, both girls. In both it was frontal in position, and was fairly severe: it was not constantly present but it came on on the slightest excuse. In one

the amount of obstruction was not very marked: in the other it was more so, and the turbinals were also enlarged. Both were cured by the removal of the adenoids. As in those two cases, the headache is usually frontal, and is more of the nature of a heaviness or a dull ache, such as is felt with an attack of coryza, rathen than an actual pain. It is largely due to the deficient aeration of the blood, and probably also to interference with the lymph circulation, as it occurs nearly always in those in whom the obstruction caused by the growth is marked. In fact, according to Mr Whitehead(35), it is rarely, if ever, caused by any disease or deformity of the nose, which does not give rise to discharge or obstruction to normal nasal respiration. The same authority in the British Medical Journal, (Jan. 28th, 1905) on 'Nasal Disease as a cause of headache' gives the actual causes of the pain to be as follows:-

(a) Pressure of the hypertrophied and swollen parts on each other, more especially of the middle turbinate against the septum.

(b) Actual congestion and inflammation of the nasal mucous membrane.

(c) Retention of pus.

(d) Disturbance of the blood and lymph circulation at the base of the

(35) Nasal disease as a cause of Headache. 'Lancet' Dec. 24th, 1904.

skull: this may probably be reflex, since it is possible to have complete nasal obstruction without any headache whatever.

There is, however, I think another cause which is a very likely one, especially when the nature of the headache is considered, and that is that it is due to rarefaction of air in the frontal sinuses, and in this it is analogous to what I think is largely the cause of the headache in coryza: by the swelling of the nasal mucous membrane round it, the nasal opening of the frontal duct is occluded, and the sinus is this cut off from the external air and the air inside it is soon absorbed, giving rise to diminished tension and thence to the feeling of discomfort. This explanation I find is also that of Dr McBride(36) in relation to frontal headache. It has also been attributed to a reflex nasal neurosis(37).

That attacks of Catarrh are extremely common in children with adenoids is not surprising when we consider the hyperaemic and irritable condition of their nasal and pharyngeal mucous membrane, and the facility for organisms lodging in the folds and deep crypts and the usual state an adenoid growth is in, being generally bathed in irritating mucus. Every facility is thus given to the action of organisms,

(36) Diseases of the Throat, Nose and Ear, 1900.
(37) Hall & Tilley. Op. cit.

and to the increased congestion of the already over full mucous surfaces: the general health being also usually in a depressed state, the individual is more prone to catch cold. As was explained in treating of the etiology, a vicious circle is thus easily established, one attack of catarrh leading to another, and all being favoured by the congested state of the naso-pharynx.

Liability to cold I found well marked in as many as 32 of my fifty cases, which shows how very prevalent the symptom is. It also indicates the extreme importance of treating the cause, for these attacks not only injure the general health, but leave all the respiratory mucous membranes in an irritable and susceptible condition, directly favouring the inroads of such important diseases as pneumonia and tuberculosis.

"A bi-lateral muco-purulent nasal discharge should always suggest adenoids in young children: as they grow older, naso-pharyngeal catarrh becomes the prominent symptom"(37). In connection with this, McBride and Logan Turner mention that the adenoid mass may become affected by a condition similar to follicular tonsillitis, and give the case of a boy of 13 who had a temperature of 100° and a pulse of

(37) Hall & Tilley. Op. cit.

106 per minute. On rhinoscopic examination the hypertrophied pharyngeal tonsil was seen to be studded with white spots.

In the article of "Adenoids" in the Encyclopoedia Medica it is stated that the common symptom of excessive cold-taking may be regarded as due to the obstruction, seeing that we find the same tendency in every form of nasal stenosis: and that it is the restoration of the normal conditions of ventilation which is responsible for the cure of the tendency to take cold in all cases of nasal obstruction.

If this means that the sole cause is the obstruction itself, I do not agree with it entirely, as I think the other factors mentioned are quite as important, if not more so, and the fact that cold taking is common in every form of obstruction can, I think, be explained by the circumstance that in these cases the mucous membrane is congested as a result of the forced efforts at breathing through the partially closed opening, the vacuum produced being compensated partly by over-filling of the blood-vessels, and the congestion renders it more liable to inflammatory attacks. The return of free ventilation means, among other things, that the congestion

disappears and the circulation in that part is more healthy and has greater power of dealing with the causes of the catarrh.

Adenoiditis. Moure[38] has drawn attention to attacks of acute and sub-acute inflammation of adenoids. As causes he gives acute coryza, follicular tonsillitis (by extension), pus infection from sinusitis, rheumatism and syphilis. The patient complains of nasal obstruction, deafness, tinnitus, and dropping of muco-pus from the post-nasal space. Posterior rhinoscopy reveals redness and swelling of the adenoid mass, with muco-purulent or serous discharge from the crypts. There are usually also signs of acute or chronic middle ear catarrh, and in children, fever and general symptoms are present. I have never come across a case of this kind.

Tornwaldt's disease is another condition which may result from adenoids. It is a chronic inflammation of the sac which is left by the partial closure of the recessus medius of neglected adenoids. In some of these cases, the median cleft becomes occluded altogether and a chronic abscess may result.

Epistaxis may occur on account of the congestion in the nose produced by the presence of adenoids. I have met with one case, in which the bleeding was

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(38) Yearsley. Op. cit.

never severe, but was easily brought on, which was cured by the removal of a fairly large pad of adenoids. The mucous membrane of the nose was congested - hence the facility with which bleeding was induced.

Yearsley did not note the symptom as often present in his cases. Crowley (quoted by Yearsley) found it in 14 per cent of his. Bleeding from adenoids may be of importance as a question of differential diagnosis, as the spitting of blood in a sickly child is very apt to cause alarm and the thoughts naturally turn to the idea that there may be serious mischief in the lungs.

Temporary loss of the power of smell and taste, as might be expected, is of common occurrence, and unfortunately, these senses may be permanently damaged if the adenoids are neglected. I have come across this symptom in several adults whose adenoids in childhood were not attended to. The loss I think is due partly to damage to the delicate nerve-endings caused by the constant congestion in the nose, and partly to loss of function from want of exercise. If the condition is treated early, however, and there is no other cause for it, there is no reason why the functions should not return completely. McBride

and Turner note the case of a boy of 5, who only began to enjoy the taste of his food after an operation for the removal of adenoids.

Atrophic rhinitis may also be a result of adenoids (Yearsley).

Deviations of the nasal septum, narrowing of the nose (mentioned in connection with the adenoid facies), hypertrophy of the turbinals, and thickening of the mucous membrane, may all be caused by adenoids. The mechanism of production is similar in all these cases, if there exists an obstruction to the entrance of air, greater on one side than on the other: with this we have a normal atmospheric pressure on the free side and a diminished pressure on the other, and this being long continued, leads to the gradual giving way of the least resisting part of the cavity, with resulting deviation of the septum towards the occluded side, or the over-filling of the blood vessels and congestion.

Asthma. This is a condition of great importance in connection with adenoids, and severe attacks have resulted from their presence, and if they are neglected, the malady may become chronic. In my fifty cases there occurred four who had well-marked asthmatic attacks. One was cured completely, and one

was greatly relieved by the operation: the third refused operation, and the fourth, a girl in whom the attacks came on about four or five times a year, was operated on so recently, that though she has had no attack since, it is too soon to say yet what effect the operation has had. Case 1 was that of a girl, M. Q. age 7, who suffered repeatedly from attacks of asthma and bronchitis: otherwise she was a fairly healthy girl. She had a fairly large pad of adenoids, which was removed, and since the operation she has had no return whatever. Case 2 was a boy, P. McL. age 9: his attacks were very frequent, especially in winter and were always accompanied by considerable bronchitis: his chest was 'barrel-shaped' and his shoulders rounded as a result of these attacks: his face was inclined to the adenoid type: the adenoids were a fairly large mass, causing a good deal of obstruction, and they were removed: the tonsils were not enlarged, but the mucous membrane of the nose was congested. After the operation, which was nine months ago, he has only had one attack, and that was a very slight one, in which the asthmatic symptoms, though present, were not at all severe. Case 3, was a girl, J.D., in whom the attacks were frequent (once every two or three months)

but her parents refused an operation. The asthma in these cases I think was partly due to the presence of the adenoid growth as an irritating cause in a susceptible person, and partly to the irritable, congested state of the nasal mucous membrane. It is well known that there is a direct connection between nasal conditions and asthma, if the nasal mucous membrane is irritable, and in such cases I think the asthma is of the nature of an exaggerated reflex, as the irritant, instead of causing sneezing or an attack of coryza, goes further in its effects and produces the asthmatic attack. According to Lepoutre[39] adenoids produce asthma as a reflex disturbance, the origin of the reflex being the nasal obstruction, which causes insufficiency of haematosis, compels the patient to make more forced and more frequent respiratory efforts, and precipitates a nervous paroxysm. McBride and Logan Turner have also noted asthma as occurring several times in connection with adenoids, and in one case there was a very marked improvement after operation: unfortunately, in this case, the asthma returned later, though in a very modified form. Hall and Tilley[40] mention that asthma has immediately disappeared after the removal of adenoids. On the other hand, Dr Greville Mac Donald[41] thinks that, with a view to curative

(39) Yearsley. Op. cit.
(40) Op. cit.
(41) Relation of asthma to nose disease. B.M.J. Nov.5th,1904.

measures, the removal of adenoids is not of much use in asthma. He is not sure that he can refer to one case of cure of asthma by removing adenoids, unless there be some co-existing obstruction in the anterior nares, although great improvement almost invariably results. Against this statement, however, he puts that of his brother, Dr McKay MacDonald, who has related two cases of immediate cure of asthma in children with adenoids, following a digital exploration of the post-nasal space and without operation. My own conclusions on the matter are that adenoids are at least an important predisposing cause of asthma, and in every such case, if they are found, they should be removed, other conditions in the nose being, of course, treated also. We can then predict that there will almost certainly be alleviation of the symptoms, but the prognosis as to absolute cure must be very guarded.

Another phenomenon which often depends reflexly on adenoids is Laryngismus Stridulus. It did not occur in any of my cases. It is nearly always associated with rickets, but in some cases adenoids also help in its causation. In fact in the 'Lancet' May 25th, 1895, Dr Eustace Smith states that laryngismus in children is invariably caused by adenoids.

removal of adenoids. A case of mine also showed this (see photograph, Fig. VII.), the boy continually twitching the muscles of his mouth and pulling up the corners, making a movement like exaggerated sniffing. The symptom was not improved by operation when I saw him last: probably it will now be a question of his breaking off the habit.

A very rare complication is that mentioned by Yearsley - optic neuritis (quoted from Konigshofer of Stuttgart). The patient was a lady who suffered from retro-bulbar neuritis of the right eye. The usual treatment had no effect, but immediate and very great improvement followed the removal of tonsils and adenoids. Yearsley's explanation is that the altered condition of the walls of the naso-pharynx would produce stasis in the ophthalmic vein or cavernous sinus, and so obstructed return from the optic nerve. Relief of this stasis would be immediately followed by restoration of the normal circulation in the nerve.

Various Digestive disorders may be the result of the presence of adenoids, and they arise in various ways. In the first place, the presence of the obstruction in the nose means that the child cannot take breath while chewing, and owing to this difficulty, the food is bolted: this is of very common

The same author[42] says that he has seen so many cases of laryngeal stridor and spasm put an end to by removal of these vegetations, that whenever these symptoms prevail, he makes it his first care to ascertain the condition of the nasal passages.

Thomson and Logan Turner[43] concluded that the neurosis causing the symptoms does not seem to depend on the presence of adenoids, or other obvious cause of reflex irritation. Yearsley[44] on the other hand is of opinion that the symptom is at times decidedly caused by adenoids. The evidence appears to be conflicting, but on the whole it is in favour of the fact that laryngismus stridulus may depend on adenoids, and their removal may determine its disappearance.

A nocturnal paroxysmal cough, usually excited by lying down, may also depend on the presence of adenoids: it is of reflex nature and is hoarse and barking.

A more remote result is that of wryneck, mentioned by Yearsley[45] as being caused by cervical adenitis dependent on adenoids.

Facial spasm may also be connected with them. Osler[46] states that he has known several instances in which permanent relief has been afforded by

(42) Wasting diseases of children, 1899.
(43) Congenital stridor in infants. M.B.J. Dec. 1st, 1900.
(44) Op. cit.
(45) Op. cit.
(46) Op. cit.

occurrence in adenoid cases, and the food, instead of being partly digested and well broken up in the mouth, is passed directly into the stomach, which suffers accordingly.

Another cause is the swallowing of the large quantities of irritating septic mucus which is constantly being secreted from the surface of the growth. The large quantities which can be swallowed were illustrated in many cases I have seen during operation, and they cannot be anything but very bad for the stomach. Other matters which help to upset the digestion are the debris from the mouth and the septic matters from the teeth which are formed when mouth-breathing is persisted in, and the teeth decay as a result.

In addition to all these, the general vitality is lowered by the many evil effects of the adenoids, and digestion suffers with the other bodily functions. McBride and Turner(46) note the case of a boy who used to have bilious attacks every fortnight, and who was quite freed from them after operation. The improvement in weight and condition which is seen in nearly all cases of adenoids after treatment, must be to a large extent dependent on the removal of these causes of indigestion.

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(46) Op. cit.

Laryngitis, tracheitis, bronchitis, and broncho-pneumonia may all be results of the presence of adenoids, especially when associated with mouth breathing. The acting cause is the same as that which was discussed in connection with cold catching, namely, inhalation of unwarmed and unmoistened air, which has not been largely freed from organisms; irritable condition of the mucous respiratory passages and general lowering of the health.

Pharyngitis sicca may be caused in a similar fashion(47).

Diphtheria, scarlet fever, measles, and other exanthemata which affect the throat, besides being causes of adenoids, are more likely to be contracted when there are present, as the unhealthy mucous membrane forms a suitable resting place for their respective organisms, and these diseases are very apt to be severe when adenoids are present, and the child may be very seriously handicapped by the additional increase to his already great difficulty of breathing, and I always find it well to warn parents whose children have adenoids that if they are neglected, the child is more likely to contract fever and to take it seriously.

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(47) MacDonald (Parker op. cit.)

Certain changes in the blood occur in cases of adenoids, and these are of considerable importance. I did not make any blood examinations in my cases, so I quote the statements of Lichtwitz and Sabrazes[48] on the subject. They examined the blood of adenoidal children both before and after operation, and compared results with that of healthy children, and found that "children with adenoids have a mild form of anaemia and leukaemia, also an increase in the large mononucleated cells, viz: the lymph cells and eosin cells, taken by the percentage method, and by absolute count per c.mm.; on the contrary, a decrease, both relative and absolute in the number of polynucleated cells. After the removal of the adenoids, the blood tends to return to the normal; at the same time the body weight increases and the general health improves. It must be noted, however, that the blood does not always rapidly regain its normal physiological characteristics."

The eye is another organ which may suffer from the presence of adenoids in the naso-pharynx. The affections caused are usually excessive lachrymation, phlyctenular conjunctivitis, weak ulcer of the cornea, and eczematous keratitis. One of my cases, a girl, S.G. age 7, came under my notice complaining of

(48) Yearsley Op. cit.

constant lachrymation from the right eye. This had been treated in various ways, none of them producing any benefit. She had the characteristic nasal facies: was a mouth breather and used to snore badly at night. A considerable mass of adenoids was present, and the right turbinal bodies, as seen by anterior rhinoscopy were considerably congested. Operation removed the adenoids and relieved the congestion in the nose and in about a week the running from the eye stopped. This case I am certain was due to swelling of the mucous membrane at the nasal end of the lachrymal duct.

Phlyctenular conjunctivitis is also very common and occurred in two of my cases, both being cured after operation. Mr Ouston, of Newcastle-on-Tyne, also tells me that many children with this complaint have been sent to him for removal of adenoids and in nearly every case the result has been satisfactory.

Mr J. Hern[49] enumerates all the above symptoms as depending largely on adenoids. He also adds a peculiar irritability of the retina with considerable difficulty in opening the eyes in bright light. He says "In all these cases I am convinced that adenoids are practically always present. What is the

(49) Effect of the presence of adenoids and other abnormalities in the naso-pharynx on some affections of the eye. B.M.J. Aug. 26th, 1905.

significance of their co-existence? Are they related as cause and effect? or, are both manifestations of a strumous diathesis? I think that there can be no doubt that the ophthalmic conditions are secondary to the naso-pharyngeal (a) by the marked lowering of health produced, (b) by actual extension of the inflammatory process up the nasal duct to the eye." I think it is most probable that the eye suffers in a similar fashion to the ear in these cases - namely, either by extension of inflammatory processes up the duct from the nose, or by closure of the nasal end of the duct from the swelling produced by catarrh in the nose.

As a reflex neurosis resulting from the presence of adenoids, we occasionally get Epilepsy, or epileptiform convulsions. I have no case of this among my fifty, but Dr St. Clair Thomson(50) gives an account of an interesting case of a girl of 6, who had suffered from petit mal since the age of 4: she had the typical adenoid appearance, and was getting deaf, so was sent for post-nasal treatment. A large mass of adenoids was removed, and the hearing and other symptoms were improved at once. The epilepsy stopped a few months after operation, and during the last six years there has been no return, during

(50) 'Practitioner' May 1905.

which time she has taken no bromide.

Francis[51] gives an interestind description of four cases of epilepsy in children, all entirely and promptly cured by the removal of adenoids. In one of the cases, digital examination of the naso-pharynx brought on the worst fit he had been known to experience. The number and severity of the attacks were greatly lessened after operation and they ceased entirely after three weeks. The other three cases were of petit mal, severe in character, and were all relieved by operation. These attacks are probably of the nature of nasal reflexes, as suggested by Professor Hack, and in this, are likely to be akin to the reflex asthma, laryngismus stridulus, etc. of adenoidal patients. Parker[52] suggests that epilepsy and asthma in these cases may possibly be caused by the deficient aeration of the blood which takes place especially at night when these attacks are apt to occur.

The presence of adenoids has a most important effect in influencing growth and development. The causes for this we do not require to go far to find and if we look back on the list of the results of adenoids this is not surprising. It stands to reason that a child who cannot feed, sleep or breathe

(51) Yearsley Op. cit.
(52) Op. cit.

properly will not reach a healthy standard of growth so long as the cause of those evils remains, and such is found in actual experience. We find also that the interference with growth and development depends on the relative sizes of the adenoid growth and the naso-pharynx, showing that it is the direct result of the interference with the entrance of air, and secondarily to that, the difficulty in obtaining proper nourishment in the very young, and food-bolting in older children. To a large extent also it is dependent on the recurring colds, to the absorption from the mouth and stomach of the septic matters which result from mouth-breathing, to the indigestion and loss of appetite and to the disinclination of these patients to take healthy exercise, and thus develop their muscles.

Another reason is that expounded by Dr Watson Williams(53). He says that "normal nasal breathing stimulates the bulbar respiratory centre and the abrogation of this physiological stimulation is one important factor resulting in deficient respiratory exchanges and consequent defective tissue metabolism. Hence the mechanical obstruction to respiration is by no means the only indication for appropriate treatment."

(53) 'Why defective nasal respiration hinders growth and development'. Lancet, Feb. 3rd, 1906.

The rate of growth in both height and girth is often surprising after the obstructing growth is removed, and this has struck me in almost every case, even without measuring the children, and it is not necessary to take elaborate measurements to convince oneself of the improvement in physique, it is sufficiently self-evident in most cases, and in some it is quite remarkable, and it shows the direct relation between the two as cause and effect. It will be seen therefore in this age of town-dwelling and national physical degeneration, what an important part the recognition and removal of adenoids must play. Castex and Malherbe[54] have reported certain observations on the rate of growth of children after the removal of adenoid vegetations. Measurements were taken before the operation and at varying intervals after. In all, thirty-five cases were traced for 3, 6, or 12 months. The general conclusion was that during some months after operation the rate of growth as estimated by increase of height, weight and chest measurement, was thrice the average rate as given in the statistical tables of Quetelet for height and weight, or of Pagliani for chest measurements. Ashbey and Wright[55] mention a case of twins, one of which had enlarged tonsils and adenoids

(54) Yearsley, Op. cit.
(55) Diseases of Children, 1899.

and was several months' growth behind the other, the lost ground being rapidly regained after operation.

Along with the interference in general growth and development, it is well to take the very important subject of the Deformities which may result from the presence of adenoids. These are fairly common and of far-reaching consequence. Many of my cases showed it, all being subjects in whom the growths caused notable obstruction: the degree ranged from what might be termed merely mal-development, as in the flat-chested and round-shouldered, to actual deformity in the pigeon-breasted and scoliosed. The importance of this subject is undoubted, not only on account of the deformities in themselves, but also because of the liability to disease of the lungs they induce and to the effect they have on the seriousness of such disease. Also, what is a curable condition in childhood when the bones and cartilages are soft, becomes later in life a permanent deformity when the structures have firmed, this showing the importance of early recognition of the cause and its removal. We all know of cases which might have been saved permanent deformity, weakness and liability to chest troubles and to whom life might have been much more of a pleasure, if the condition had been recognised

and its significance grasped. The deformities of the mouth and nose have been noted: of great importance are those of the chest, and spine. The cause in some cases may be due to muscular weakness, the positions taken up e.g. in sitting or in standing, to relax the muscles as much as possible, becoming more or less fixed. This is most usual in the spine, affecting the thorax secondarily, and kyphosis and scoliosis may be induced in this way. Asthma, depending on adenoids, may also cause the 'barrel-shaped' or emphysematous type of chest, an example of which, P. McL., I gave in connection with asthma. The most usual cause, however, is that of nasal obstruction, and, as in the case of nasal deformities, the mechanism of its production can best be watched while the patient is sleeping, though it is also easily visible when he is stripped in the consulting room. With the breathing channel obstructed, a partial vacuum must exist with each inspiration, and this vacuum reaches from the obstruction in this case, the adenoids, right down the respiratory passages to the bases of the lungs. The result is that the intra-thoracic pressure is less than the extra-thoracic, and as a natural result the yielding parts are driven inwards with each breath.

Now the most yielding parts which respond to this increased extraneous pressure are the anterior triangles of the neck and the ribs and intercostal spaces, which can be seen to sink in with each laboured inspiration, this being especially noticeable in the lower ribs. We thus have illustrated what the possible result may be as regards chest formation if the adenoids are allowed to persist, as unfortunately they sometimes even yet are. The chest as a whole is flat, this being particularly noticeable in the infra-clavicular regions: the supra-clavicular regions are also sunken. Well-marked pigeon-breast may also be developed, and was noticeable in several of my cases, all of which improved after operation, the parents being given instructions to to making the child carry himself properly. In pigeon-breast, the atmospheric pressure makes the ribs give way in front of their angles and at the costo-chondral junctions, so that the sternum is pushed forwards, the chest thus bulging at its upper and middle parts and being retracted in its lower part. The antero-posterior diameter is thus increased and the lateral is diminished. Associated with it we often find Harrison's sulcus, passing from the xiphi-sternum downwards and outwards towards the

mid-axillary line, the yielding here being where the ribs are least resistant, the greater curve of the upper ones and their more direct attachment to the sternum preventing their falling in to such a marked extent while the lower ones are more supported by the liver and other abdominal organs, very often, in fact, pushed out in cases where there is a tendency to flatulent distension. These causes are most potent when the child with adenoids also suffers from rickets, as then the bones are soft and the deformities are much more easily produced. Dr Eustace Smith[56] states, in fact, that in most rickety children with marked chest distortion adenoid growths will be found in examination of the naso-pharynx. Along with the chest deformities there is generally an antero-posterior curvature of the spine, which, as hinted above, is increased by the want of tone of the muscles and the consequent listlessness of the patients, and later on, scoliosis develops for the same reason. As Mr A. H. Tubby puts it[57] "If a series of cases of adenoids be watched, these facts may be observed. During infancy and early childhood the subject of nasal obstruction shows deformity of the chest alone: in other subjects, and especially between the ages of six and ten years,

(56) 'Wasting diseases of children' 1899.
(57) 'Deformities: a treatise on orthopaedic surgery' 1896.

kyphosis makes its appearance. Later, from ten to sixteen years of age, scoliosis supervenes on the kyphosis, the abnormal shape of the chest still being very apparent. We have, therefore, this order of events: adenoids, contracted chest, kyphosis, scoliosis." The 'funnel-breast' or 'trichterbrust' in which there is a depression at the lower end of the sternum may also develop in this way, as in some cases the sternum may be seen to be drawn in, and shape towards this deformity, during the obstructed inspiration. That all these results may be caused by adenoids is evident both by watching their method of development in obstructed breathing, and by the results of treatment, and these show the great importance of recognising and treating the growths in time.

Not a symptom nor a complication of adenoids, but a very common accompaniment is enlargement of the faucial tonsils. Their position at the upper end of the alimentary tract renders them liable to many of the influences which are responsible for the development of adenoids. They also form part of Waldeyer's lymphatic ring, are analogous in structure to the pharyngeal tonsil and are likely to be affected by similar conditions. The tonsils were enlarged

in 23 of my cases of adenoids, and probably lent their aid in the production of many of the symptoms, especially in hindering the proper entrance of air into the lungs, and in favouring the lodging of organisms and the production of toxins. It is more common to find enlarged tonsils accompanied by adenoids than the reverse condition. McBride and Turner found, out of 427 cases, only 6 per cent with hypertrophied faucial tonsils; Yearsley out of 307 cases had 131 with enlarged tonsils.

I have left to the last what I consider the most important of all the complications of adenoids, namely, their effects as regards the ears. I consider this the most important, as it is am immediate danger caused by the presence of adenoids, threatening even life itself, and because its results are so apt to become incurable if neglected, leaving permanent damage to the important organ of hearing. Ear complications are also among the most common of the results of adenoids, and if we take it that for practical purposes the Eustachian tube and the middle ear may be regarded as prolongations of the naso-pharynx, this can be readily understood. The connection between the two is close and in all septic conditions of the throat the ear runs great danger of infection: this is very noticeable, for example, in scarlet fever.

Adenoids produce various effects on the ear, all of which are serious if neglected. Thus we may begin with simple tinnitus (probably caused by irritation of the thickened mucous membrane, on the nerves, especially the branches of the trigeminus in the naso-pharynx(58)), and go on to occasional deafness, constant deafness, thickening and indrawing of the drum membranes, acute and chronic otitis media, suppurative and non-suppurative, and following these it is not a far step to mastoid disease, and various suppurative conditions in the brain.

Ear troubles, as I said, are very common with adenoids. Of my 50 cases, 22, or nearly a half, showed evident symptoms of ear affection. Five of them suffered from only occasional deafness, coming on with the slightest cold in the head; eleven were, for the time being, constantly deaf, but without any suppuration: the remaining six suffered from deafness and discharge from one or both ears. Most of these cases were also sufferers from symptoms of nasal obstruction, but two or three had no such symptoms, showing that it is not only the size of the growth, which causes deafness, but its presence as a nidus for infection. On the other hand, there were several of my cases who exhibited considerable

(58) Barr 'Diseases of the Ear'.

obstruction, but had no deafness.

The statistics of other observers show a much larger percentage of ear troubles in their cases, but I attribute my smaller number to the fact that my cases were drawn entirely from private patients, who noticed the symptoms and sought advice before much harm had been done to the ears. Meyer found 72 of his 102 original cases to have aural troubles, and Woakes discovered ear complications in nearly 95 per cent of his cases(59). McBride and Turner(60) found that only 196 out of their 500 cases had normal hearing, and of the remaining 304, 22 were deaf in one ear only. Yearsley(61) found deafness with discharge in 144, and deafness without discharge in 111 of his 307 cases.

That the deafness, suppuration, etc., depend largely on the presence of adenoids is shown by the exacerbations being present during catarrhs when the mass was swollen, and by the effects of treatment in either curing or relieving the deafness and suppurative symptoms.

As an example, take the case of G.F., age five: he was a mouth-breather and snored at night: had constant slight deafness, with occasional exacerbations: the drum membranes were indrawn and transparent

(59) Parker Op. cit.
(60) Op. cit.
(61) Op. cit.

looking: there was no suppuration. A considerable mass of adenoids was removed from the back of the naso-pharynx and the fossae of Rosenmuller and the hearing was improved in a few hours and perfectly good in a couple of days. He has had no return of deafness since.

Another is the case of A.H. age nine, who had recurring attacks of earache, and running from the right ear for the last year, but very little attention was paid to it. The left drum membrane was indrawn and slightly thickened: the right membrane was also indrawn and thickened and had a perforation, with purulent discharge exuding: she was almost completely deaf in that ear: in the other the hearing was moderate. Operation was performed for the removal of adenoids, and with appropriate treatment to the right ear, the discharge was greatly improved, though not quite better when I saw her last. Catheterisation also improved the hearing in the left ear. These are only two examples out of several, but they illustrate the importance of treating the condition by removal of the growth.

Adenoids may cause deafness by pressing on the posterior and upper wall of the mouth of the Eustachian tube: this occurs when the growths are

present in the fossae of Rosenmuller: or by inducing naso-pharyngeal catarrh, the swelling of the Eustachian mucous membrane which is produced by extension, may close the tubes. In both of these cases, air is prevented from getting into the tubes during swallowing, and the contained air is soon absorbed, with a consequent driving in of the tympanic membranes by the atmospheric pressure. In these cases we get the constant deafness or the slight exacerbations. The drum membranes on examination present a characteristic appearance. The handle of the malleus and the adjacent part of the membrana tympani are drawn in and may rest against the inner tympanic wall. The short process of the malleus stands out prominently, supporting two folds of the membrane. The commonest mode in which adenoids produce deafness is by this spread of catarrh up the Eustachian tubes. This may be limited to the tubes, its only effect on the middle ear being the indrawing of the membrane, but more usually exacerbations occur, generally from re-infection from the throat: these take the form of acute otitis media, the middle ear being either infected directly by the spread of inflammation and organisms from the throat, or more indirectly, the Eustachian tubes bearing the first brunt of the attack, the exudation which takes place

from its mucous surface becoming infected and purulent, and the middle ear becoming infected in turn.

The recurring attacks of earache which we so often find in children with adenoids, are of this nature. If the drum membrane is examined then, it is found to be in a state of acute congestion and probably a perforation will follow. If not, there is a great probability that the mastoid antrum will become infected by extension from the ear. The less virulent attacks lead to hypertrophy of the mucous linings of the tubes and tympanic membranes, causing chronic hypertrophic or non-suppurative otitis media: in others in which there is more virulent inflammation, or greater activity of the secretory glands, we are likely to get chronic suppurative otitis media, the cavities becoming filled with purulent fluid and perforation or more serious consequences being the result.

Suppurative conditions can very readily take place in the ear as a result of infection, either from colds or from one of the exanthemata, or from tubercle, as the adenoids which carry the organisms are generally close up to the Eustachian openings and besides inducing the catarrhal and weakened state, can plant the organisms almost directly in the

tubes, and of all the organs - lungs, stomach, eye or ear - which the adenoids supply with infection, there is no doubt that the ears are the greatest sufferers.

As adenoids also markedly interfere with the blood and lymph circulation to the middle ear, they can also cause mischief in this way, lessening its vitality and diminishing its functioning capacity. If the effects on the ear are limited to occasional deafness from pressure or to slight Eustachian catarrh, there is great hope for relief after operation, but if it is allowed to go on to suppuration, it is a very different matter, as in these cases it is very common to get ankylosis, scar-tissue formation, necrosis of the ossicles, and mastoid or cerebral suppuration. Hence the great importance of removing the fons et origo of all this mischief is obvious: and though the minor symptoms may possibly be relieved when the patient grows up and the naso-pharyngeal space becomes larger, it is most evidently unsafe to wait for this in view of the great and irreparable damage which may be caused by delay. The presence of adenoids also tends to promote the chronicity of the ear troubles, not only by the induction of Eustachian catarrh and partial stenosis,

but by preventing the proper physiological functioning of the tube.

Septic or tubercular meningitis may be among the sequelae of ear disease caused by adenoids, and of this, I can recall one very marked example to mind. This was a hospital patient, a boy of five, who was admitted with signs of disease in the left mastoid antrum: this was opened and found to be full of pus, with the ossicles necrosed. Adenoids were present, but were not removed at the time. A few days later, the right mastoid showed similar signs, and was also opened, a similar condition being found: by this time the boy's state was very bad and symptoms of meningitis supervened of which he died in about a fortnight. At the post-mortem examination, both mastoid antra were extensively necrosed and the contained pus was very foul: well marked tuberculous meningitis was also present. This case I am certain originated in the adenoids which were present, and serves to show how extremely important they are as regards the ears and the neighbouring structures.

From the frequency with which they induce aural symptoms, from the possible severity of these symptoms, and from the difficulty or impossibility of

curing them once they have a good hold, it will be seen how important it is to recognise and treat properly the hypertrophy of the pharyngeal tonsil, and this would certainly be the case if the ear was the only organ in the body which was deleteriously affected by this hypertrophy.

## DIAGNOSIS OF ADENOIDS.

The diagnosis of cases of adenoids is as a rule easy, and depends on vision and palpation. Very often the appearance of the patient is enough to indicate the nature of the case, but it is not by any means infallible, so recourse must be had to other methods of examination. A very large majority of the children who present the 'nasal' facies, combined with deafness, nasal speech and other symptoms, are sufferers from adenoids, but it is not safe to diagnose the condition from the appearance alone. Other causes of chronic nasal obstruction may produce the nasal face, and so it is necessary to proceed to more certain methods of diagnosis. Of these, the only two of any importance are posterior rhinoscopy and digital palpation, unless it be in such a case

as cleft palate, when the growth can be seen directly. Of these two methods the former should, if possible, be used first, for digital examination, is, to say the least of it, very unpleasant to the patient, and in many cases frightens children so that subsequent treatment is rendered more difficult. It is well to try to gain the child's confidence before proceeding to examine, as the introduction of the spatula and rhinoscopic mirror is enough in many cases to raise opposition: with a little tact and patience, one can often succeed in reassuring him that there is no reason for fear and this makes the examination much more easy. In the first place the mouth and pharynx should be examined: here there is often additional aid to diagnosis to be found in the presence of enlarged faucial tonsils and of lymphoid nodules at the back of the pharynx. In most cases in which the tonsils are chronically enlarged it is safe to assume that there is also hypertrophy of the pharyngeal tonsil, and the presence of lymphoid nodules is very characteristic of adenoids. The nodules are seen at the back of the pharynx: they are pinkish and smooth: their size varies, but they are often as large as a split pea and they may show dilated blood vessels running over them and they may

be covered with mucus. They are hypertrophied lymphoid tissue, but not adenoids. Proceeding to posterior rhinoscopy, the smallest size of mirror is of course used. The adenoids are seen as a reddish mass, the colour varying from pink to dark red and depending largely on whether they are congested or not: in many cases the furrowing can be made out, the central furrow being usually the most obvious one, but they are often so covered with mucus that the furrows are invisible. The growth fills up more or less the whole posterior nasal space, hiding the septum or the upper part of it and the posterior ends of the turbinals: portions of growth may also be seen packed away in the fossae of Rosenmuller and surrounding the Eustachian tubes, possibly pressing on them and thus accounting for deafness.

In cases where posterior rhinoscopy is impossible, as in a very young or a very fractious child, examination with the finger is employed. This is unpleasant, and should be carried out as quickly, but withal as thoroughly as possible. The method I always employ is to stand behind and to the right side of the patient, who may be either sitting or standing, according to the observer's convenience. The head is held steady against the examiner's body,

with the left hand, the first one or two fingers pressing the cheek gently between the teeth, so that in the event of the patient's trying to bite, the cheek can be thrust into the mouth, and the observer's finger saved. The first finger of the right hand is passed rapidly into the naso-pharyngeal space, which is explored from left to right with the pulp of the finger, not forgetting to feel for any growth about the Eustachian orifices. The information given to the finger depends on the size and consistence of the mass. If large and soft, the finger appears to sink into a yielding growth which more or less fills up the space: varying degrees of size and consistence may be met with some feeling firm, with the sulci well marked: in others very little hypertrophy is met with in the middle part, most of it being in the fossae of Rosenmuller. In most cases, especially in the softer ones, the finger when withdrawn shows that there has been slight harmorrhage, as the adenoids bleed very easily. Occasionally they may be seen by anterior rhinoscopy, but there is no advantage in this method of examination. Given then, the appearance of the patient and a positive result with rhinoscope and finger, we are morally certain that adenoids are present; but

there are certain conditions which may simulate adenoids closely. A sarcoma in this region may give to the examining finger a sensation quite like adenoids, and McBride and Logan Turner[62] mention one such. They are, however, very rare in this part of the body, especially in children; they are the seat of recurring haemorrgahes, which are sometimes violent, and serious symptoms soon supervene. The microscope too would soon show the nature of the growth. Garel[63] has recorded cases of two patients, aged 10 and 15 respectively, in whom tertiary syphilis produced a condition of the naso-pharynx indistinguishable from adenoids. One case was operated on and the operation was followed by a typical perforation of the palate. In the other, which was not operated on, a perforation also appeared about two months after the first examination.

Other conditions which may give rise to a question of differential diagnosis are:-

(1) Polypi and fibrous growths: these are much rarer in children: when seen by posterior rhinoscopy they are much more defined than adenoids and feel quite different to the examining finger, being harder and more unyielding and not bleeding so readily.

(2) Enlargement of the posterior ends of the turbinates, which can usually be easily distinguished by inspection and palpation.

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(62) Op. cit.
(63) McBride and Turner. Op. cit.

(3) Retro-pharyngeal abscess, in which the symptoms are much more acute, and which, though soft like adenoids, has a rounder and more distinct feel as a rule, and generally appears lower down in the naso-pharynx.

(4) Narrowing of the anterior nares and other conditions inside the nose, which, though they may produce the adenoid facies, can be readily recognised by anterior rhinoscopy. They are often accompanied by adenoids.

## PROGNOSIS.

The prognosis of adenoids is on the whole decidedly good. It depends, however, on whether the growths are neglected or whether they are properly treated and at what age, and on the condition of the complications. The younger the patient is the more likely is he to recover entirely, unless permanent mischief has been done to the ears.

Of my fifty cases, forty-eight were operated on: the two which refused operation showed no improvement of their symptoms. Of the forty-eight, forty-one were completely cured of all their symptoms; the remaining seven were all greatly improved, but one or two symptoms remained, generally discharge from one or both ears or perforation of the tympanic membrane, or in one case, asthma, though vastly improved, was not quite cured.

Crowley[64] gives statistics of his operation cases which are interesting from the point of view of prognosis. He divides them into four classes -

(a) Quite successful.
(b) Practically successful.
(c) Improvement only.
(d) No improvement.

In the first class there were 143 out of 200, and in them the symptoms caused by the growths were entirely removed. The twenty-three belonging to the second class showed some one symptom remaining to a slight degree, e.g. snoring, ear discharge or deafness. In the third class there were twenty-five, the continuance of symptoms in them depending on otitis media, enlarged tonsils or hypertrophic rhinitis. In the remainder there was no improvement.

If adenoids are neglected, and allowed to produce their effects, the prognosis on the whole is not good. It depends of course on the size of the growth in relation to the naso-pharynx, on the amount of obstruction it caused, and on its effects as regards the ears. But it always remains as a source of danger as a nidus for infection: it is liable to cause and keep up various inflammatory conditions in

(64) Yearsley. Op. cit.

the neighbouring structures, and they may at any time become enlarged from inflammation and intensify any mischief they may have already caused. It is not safe to tell the parents, as is so often done, that the child will 'grow out of it': he may, but the chances are that he won't, or that if he does, they will have by that time caused permanent damage. As the patient grows up and the naso-pharyngeal space becomes larger the growths produce less obstruction and may shrink from fibrous tissue formation, though this does not always occur, as was mentioned in dealing with the pathology. In these cases, there is easier breathing and less suction on and irritation of the mass, and soon it will tend to disappear, or at any rate to cause fewer symptoms. But by this time permanent damage may be done to the chest or to the ear, or the child may have suffered from the hindrance to education, and in view of the constant menace of adenoids it is better to leave nothing to the future to possibly or possibly not accomplish, but to operate as soon as possible.

If properly treated, however, and that before permanent damage is done, the prognosis is very good indeed, and we can cheerfully prophesy a cessation of the symptoms, provided, of course, that no other

morbid condition accompanies the growth. If left until bad habits become fixed, or in such cases as asthma, laryngismus, and some cases of deafness, the prognosis must be guarded, though in those cases we can generally hope to do much good. In the case, for example, of mouth-breathing, the removal of the obstruction will not make the child breathe through the nose, but the bad habit must also be broken. In some cases of deafness also, inflation or other treatment to the ears may be necessary; but on the whole, it may be repeated, the prognosis is very good, and we can confidently promise, if not cure, at least, great alleviation of the symptoms, provided always that our instructions are carried out as to breathing and other hygienic matters. These may take a considerable time to show improvement, but with patience, it can generally be accomplished. Of the symptoms regarding which prognosis will be asked, the chief are those which concern the ear, and in these, it entirely depends on what the condition of affairs is. If the membrane is merely indrawn, but not fixed, and only slightly thickened, the prognosis is very good. So is it with regard to attacks of earache, which have not left permanent damage. When the membrane is fixed, however, or

where there is perforation, suppuration or further damage in the middle ear, the prognosis depends on the extent of the mischief, and the care which will be taken to remedy it, but in any case we can say that without removal of the adenoids, the condition will not improve but will likely become worse, and with removal, there is a good chance of some improvement. As regards the recurrence of adenoids after removal, it may be said that if thoroughly and properly removed, and if bad habits are corrected, the chances are great against their return. In a few cases, however, in spite of all we can do there is recurrence, and the risk of this has to be taken.

As regards risk of mishap at the operation, it is very slight if proper precautions are taken. I have operated on, or assisted at the operation of, many cases in private, and two or three hundred in hospital practice, and have been fortunate enough to have had not only no death, but not a single case which caused anxiety either during the operation or after it from haemorrhage; nor so far as I know, has any septic mischief taken place in any of my cases after removal of the growth.

Therefore I think the risk is a minimum one, though occasionally a death does take place from the anaesthetic or from haemorrhage; but that is a risk which has to be taken in every operation, no matter how slight.

## TREATMENT.

I do not think that anyone will question the necessity for the treatment of adenoids in the face of the many symptoms and dangers which may accrue from their presence. The 'let alone' policy is a highly disastrous one in this case and some form of treatment is always necessary when adenoids are present.

As to the mode of treatment, opinions differ and thus we may have the 'expectant' or palliative treatment and the operative. Both have their advocates, but the very large majority of authorities on the subject are of one mind in this, that they agree that operation of some sort for the removal of the growth is necessary. A few, however, hold to the non-operative policy, so to make the discussion of the treatment more complete, it is better to mention the various methods which may be carried out.

Personally I may say I have practically no experience whatever of this type of treatment, as almost every case of adenoids which I have come across, has presented one or more symptoms which necessitated operation. One or two, however, came under notice by accident, e.g. in cases of enlarged tonsils, in which the sum total of adenoid growth amounted

to only a roughening of the posterior nasal space. In these the tonsils were removed, but nothing in the way of operation was done to the adenoids. A tonic was given after the operation on the tonsils, and instructions to watch carefully for any symptom of increase of the adenoids. Such are the only cases which I would treat in this fashion - namely, those in which the growth is very small indeed, and in which it causes no symptoms whatever. These cases are usually only discovered by accident and it is probable that many children may have this slight overgrowth of the pharyngeal tonsil, which is never noticed and which never does any harm at all, but these cases can barely be considered pathological. My treatment for them, if any treatment is needed, is a tonic, with or without iron, a holiday at the sea-side if possible, prompt treatment of any colds, a healthy, open-air life, with plenty of exercise to encourage free breathing, no coddling, and immediate attention should any signs of enlargement of the growth be detected. There is no need in these cases for nasal douches or other nasal medication. They are worse than useless, if their sole object is to diminish the size of the growth, because, being unpleasant to a child, they make any

further treatment which may be necessary much more difficult, and the tampering is generally more apt to irritate the nose, and possibly make the over-growth worse. If there is slight swelling in a case which has an acute coryza, it is, of course, not necessary to operate unless the swelling remains and causes symptoms: these cases can be treated with warm saline solution syringed gently along the nose, and from personal experience of such treatment I can testify that it is often very soothing and tends to remove the catarrh. After its removal, some more astringent remedy may be used, e.g. glycerinum acidi tannici and water as a weak solution, either injected down the nose or brushed on to the naso-pharynx. These methods of treatment can, of course, have no effect if the growth is of any size and in these cases it is waste of time to try them. Another form of palliative treatment is that practised by Arbuthnot Lane[65] namely respiratory exercises. The essentials of it are that the child should breathe properly and as deeply as possible so as to increase his vital capacity, and that the mouth must be kept shut habitually and especially during the breathing exercises. He claims that

(65) 'Some points in the mechanics of the skeleton'. Edin. Med. Journ. 1899.

in most cases these exercises can take the place of operation and that if operation is required it is as an adjunct to the exercises or to shorten the time of treatment. I have never tried these exercises in any of my patients in place of operation, so cannot speak with any experience on the matter, but it certainly appears to me that they could do very much more good after rather than before the operation, and even if they were persisted in, which is unlikely, as they would of necessity cover a very long time, that the results, if good at all, would not be nearly so beneficial as complete operation. During this treatment also there is plenty of time for symptoms to get worse, or for complications to arise, and this can be avoided by operating as soon as possible, and after that the exercises will be of great use.

Operative Treatment. I consider that operative treatment in some form or other ought to be undertaken to remove the growths altogether whenever they give rise to any signs whatever of being likely to do mischief or to be a nidus for infection. The time for operation is as soon as convenient if the child is not in a very run down state or is not suffering from any acute illness, unless the adenoids

in such a case are a menace to life. He should be in as good a state of health as possible, but in most cases it is not necessary to waste time over palliative measures, but to operate, as that is the best means for improving the health, and the operation - though it should not be approached as if of no consequence - is not such a serious one that a little depression in health will do any harm. He should, however, be free if possible from any cold and should have a day or two at home from school before the operation. Of course, it should not be undertaken if there is infectious disease in the house at the time, for though I believe that the presence of adenoids will render the patient more likely to suffer from the disease, the danger is not nearly so great as it would be if they were removed and a raw absorbing surface left for the organisms to flourish on: and probably in this latter case, the disease would be much more severe and much more likely to infect the ears. In such cases, try to prevent infection of the throat as much as possible by the use of mild antiseptic douching, and operate when the fever has subsided. With regard to the removal of adenoids during acute otitis media, scarlatinal or otherwise, there has lately been some

discussion[66]. The general opinion is that the growths should be left alone until the fever has subsided, and then removed, as if removed sooner, a raw septic surface is left which is very likely to do harm. Treatment should therefore be directed towards easing the aural symptoms as much as possible and removing the growths after the temperature has become normal, or when the symptoms have become less acute. Dr W. Hill[67] states that he had unexpectedly removed tonsils and adenoids in two cases of acute exanthematous condition with otitis, and the amount of pain and sloughing which took place when the delayed rash appeared was so great that he felt the procedure to be a bad one. Dr Milligan[68] has had a similar experience. McBride and Turner[69] say "if foetid otorrhoea is present, it is advisable to postpone the operation until this condition has received treatment."

In regard to the otitis of scarlet fever, Dr Gordon, of Manchester, states[70] that "in these children, the otorrhoea often does not appear until the third week of the disease or later, while the faucial inflammation has sufficiently subsided to permit of the removal of the post-nasal growths,

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(66) 'Lines of treatment in preventing acute middle ear suppuration from becoming chronic. B.M.J. Nov. 4th, 1905.
(67) Ibid.
(68) Ibid.
(69) Op. cit.
(70) Manchester Medical Chronicle. Sept. 1905.

without inconvenience, at the end of the first fortnight. At or about this period, therefore, it is best to remove adenoid vegetations whenever they are found to be causing nasal obstruction". If, however, the fauces are the site of a severe septic condition, they should be removed, as their presence only serves to prevent the healing of the throat.

Anaesthetics. Coming to the anaesthetic, I have used ethyl chloride, chloroform and gas, and strongly believe in the use of ethyl chloride whenever possible. I started using it for these cases over two years ago, and have employed it in nearly every case since, and have always had good results from it. I prefer it to gas because of the much longer anaesthesia which can be got, and because it is so much easier to give a further dose if necessary: it is not unpleasant to take and it does not cause the facial congestion which we get with gas, nor have I found the bleeding to be usually so great. I prefer it to chloroform as I believe it is safer - I have never had any accident whatever with it - because the anaesthesia takes a much shorter time to induce, and is thus saving to the patient and to the operator who may have several to do, and because the patient comes out much more quickly and so can be

made to sit up after the operation and so lessen the bleeding.

The dose I always have used for children is 3 c.c. or occasionally 5 c.c. for an older child. The apparatus I have used for its administration is Lobjois' or Daniells'. I prefer the latter, as with the Lobjois the does is given too suddenly, while with the other, it can be gradually given and easily increased if necessary. I found the length of time necessary to induce anaesthesia in a child who did not struggle or hold the breath was 20 to 30 seconds, 30 to 40 if there was any struggling. A few seconds more can safely be given to insure the anaesthesia being long enough. The average duration of anaesthesia when the ethyl chloride was properly administered was two minutes and in one case it lasted for three minutes. Even a minute or a minute and a half is often quite long enough for a moderately quick operator to do all that is necessary. I have had very little sickness after its use, but this is not invariable: the sickness, however, seldom lasted longer than an hour or so, and I never had the persistent vomiting which we sometimes get after chloroform. Then, as I pointed out, the patient soon comes round and can safely be made to sit up and so help to stop the bleeding.

Nitrous oxide gas I have given in a few occasions, but almost invariably found that the anaesthesia was too short and it was not pleasant to conclude the operation (with uncertainty as to its being properly done) with the patient kicking and struggling. Also the bleeding was generally more severe, owing to the congestion of the head. Chloroform I have used a good deal for these operations, and rank it next in usefulness to ethyl chloride. I always give it to very young children, as they take it well and very soon go 'under'. Its advantage is its longer anaesthesia and that the exact dose necessary can be given, so that the cough reflex is not abolished, and in this case we can be certain of doing the operation absolutely thoroughly. Its disadvantages are its greater danger (though on the whole this is not very great if proper precautions are taken) and the longer time necessary to induce anaesthesia, which is of importance if several cases have to be done. I prefer to give it on a towel which rests on the anaesthetist's hand, which is slightly raised from the patient's face by the finger tips. In this way there is plenty of room for the entrance of air, we can always feel the breathing, and the feeling of the hand generally gives the

patient more confidence. Ether I have never used in these cases, and believe it is harmful on account of the greater congestion induced and consequent greater bleeding, because of the liability to its being followed by catarrh, and because it is more irritating to the respiratory passages. Some people, however, believe in it and always use it. Others use a mixture of nitrous oxide gas and oxygen and find this gives plenty of time. I have no experience of this mixture, but believe it is a good one. Older patients may be operated on under cocaine, or cocaine or eucaine and adrenalin, but this is not admissable in children as it is more difficult to perform the operation completely, as they are unlikely to lie still, and it is frightening to a child, and one is more apt to hurry the operation and get it over. Also there is a danger of haemorrhage after the effect of the anaesthetic passes off.

Instruments. There is a very large number of instruments which may be used for the operation, and their utility varies. Each operator has his favourite, and many have their own modifications of the original instruments, the differences in them usually being in the direction and degree of curve, and other unimportant details, and it is unnecessary to

describe every slight modification. The usual ones are the various forms of curette or ring knife, forceps, finger nails (natural and artificial), wire loops, and adenomatomes. The last two may be passed over with a word, as it is absolutely unnecessary to go through the difficult and unsatisfactory process of trying to snare adenoids through the nose, and probably missing a large part of them when it can be done so much more easily and completely with other instruments.

Adenomatomes in the first place will probably not remove much more than half the growth, as they cannot so well reach into the recesses and they are far more powerful than is necessary, so that if any other object comes within their grasp, it is likely to suffer severely.

The instrument I always prefer to use is Delstanche's modification of Gottstein's curette, i.e. a Gottstein's curette with a small cradle attached to the front, in which are two small hooks, which catch the growth when it is removed and bring it away. This serves to bring away the greater part of the growth, but if more is left, it can either be used again or the ordinary Gottstein may be used, and I have no particular preference for either one

above the other, having accomplished as much with the one as with the other. If any tags are left I like to remove them with the conchotome. Meyer's ring knife which is used through the nose to finish off the operation, I have never employed, and do not think it is necessary, as all the growth should be removed with the curette from the mouth.

If the tonsils are also to be removed I prefer to do it with the knife, as I think most satisfactory results can be got in this way and we can see exactly how much we are removing. The guillotine I have also used and find very useful, but I prefer the knife. Modifications of the curette are those of Beekmann, Politzer, Hewetson, St. Clair Thomson, Mackenzie, Holden and Golding Bird, among others. Ring knives are those of Meyer, and Hartmann.

The forceps generally used are Lowenberg's. They are useful for removing small growths or parts which have been left by the curette. They are largely used by some operators, who employ no other, and are introduced into the naso-pharynx, and by a partly cutting, partly tearing movement, they remove the growth piecemeal. Care has to be taken in using them not to strip the mucous membrane down the pharynx, as it does not tear easily, but becomes lifted

up and stripped off its support: also, not to punch out a piece of the septum nasi.

Some operators prefer to use the finger nail or a steel artificial substitute for it. It has to my mind great disadvantages. The natural nail is not strong enough to remove soft growths completely, and certainly not to remove tough fibrous ones. It is almost impossible to clear out the space properly with it and tags are very likely to be left. The artificial nail I have never used, but I do not believe it is possible to remove the growths so thoroughly as with the curette. The instruments most generally used are Gottstein's and Delstanche's curettes, and Lowenberg's forceps, and by some, Meyer's ring knife, though the other instruments all have their supporters.

Position. The position of the patient is of importance, if a general anaesthetic is given. He is of course on his back. I sometimes use a small pillow during the administration of the anaesthetic, as breathing is easier when the head is not too far back, and it is more comfortable for the patient. As soon as he is 'under' the pillow is removed, and he is pulled up the table till the head lies completely beyond it, and it should either rest on the

assistant's hand or on a head rest. I prefer the former as it can be more easily moved if necessary into any required position: but in any case I do not believe in allowing it to hang as far down over the table as possible. It is claimed that in this position the blood will not be able to run down into the trachea, and neither it will, but it is not necessary to have the head hanging so low to prevent this: it can easily be prevented if the head if on a level slightly lower than that of the body, and in using this position I have never had the slightest difficulty in keeping blood out of the air passages. Another good reason for not having the head so low is that in that position the anterior muscles of the neck are tightly stretched and make respiration much more difficult than if the head if higher. The greater difficulty of respiration is easily demonstrable to any one who will try the effect of the position. And in that position also there is much greater congestion of the head and the bleeding is more severe. The patient's head then, is kept at a slightly lower level than the body and in a straight position during the operation. Whenever it is completed, turn the patient almost completely round on his face - not the head alone, but the whole body -

and the blood will be allowed to run out. The bleeding will soon stop and if ethyl chloride or gas has been given, the patient can be set up as soon as he comes out of the anaesthetic, and still further stop the bleeding. If chloroform has been given he should be left on his side until the worst of the bleeding is over and then be put back to bed, but always kept on his side. Thus the risk of inhaling blood will be reduced to a minimum and very little will be swallowed.

Operation. We shall suppose, as it is so often the case, that enlarged tonsils have to be removed as well as the adenoids, and thus give the combined operation. The patient is prepared in the usual manner the night before - that is, a dose of opening medicine is given, and a light, easily digested meal before bed-time. It is not necessary to starve the child completely in the morning: a cup of soup or beef-tea may be given two or three hours before the operation, and will not only do no harm, but will relieve any feeling of sinking at the operation. Nothing solid should be given, and no milk. The mouth is better to be washed out at night and in the morning, with some mild, unirritating antiseptic. The room should, of course, be as bright and airy as

possible and should have a fire on. Old newspapers, etc. may be spread over the floor to save the latter from blood stains. The instruments are carefully sterilised, as also the operator's hands as far as possible. If ethyl chloride or gas is given, it is necessary to put a mouth prop between the teeth as it is generally found that the jaws are clenched when the patient is 'under', and time is lost in trying to force the gag in, and damage may be easily done to the teeth by forcible and hurried pushing to get it in. If the prop is used, the gag can be easily slipped in when necessary. With chloroform the prop is not necessary, but it may be used if desired. As soon as the patient is 'under' and brought into position and the gag inserted, the operator with the finger feels the toncils, and separates if necessary, any adhesions between them and the faucial pillars. If the knife is used, and I prefer it, grasp the tonsil with a vulsellum, and hold it gently inwards, cutting at the same time from below upwards so that our view is not obscured by blood. Remove both tonsils in this way, or with the guillotine if preferred. Then, taking the curette, Delstanche's preferably to begin with, and holding it firmly, pass it well back as far up as possible,

into the naso-pharyngeal space (avoiding, of course, the uvula) and pressing it backwards, remove with a clean sweep, as much as possible of the growth. Then with either Delstanche's or Gottstein's curette, whichever is preferred, clear out the back of the naso-pharynx and the fossae of Rosenmuller of any remaining growth, taking care not to remove the pharyngeal ends of the Eustachian tubes, which may easily be done if the operator is careless. Examine carefully with the finger and make sure that all the growth is removed, and if it is, turn the patient round and allow the blood to run out. Some operators finish up by passing Meyer's ring knife through the nose and scraping away any remains, but I do not think this is at all necessary. If any tags are left and can be seen soon after the operation, remove them at once with the conchotome: they may, however, not be noticed till afterwards, but will do no harm if removed soon. Do not attempt to remove them by pulling with forceps or the result will be stripping off of the mucous membrane of the pharynx. If the nostrils are contracted or if there is not much breathing space, it is a good plan to dilate the passages firmly but gently, with Hegar's dilators before operating on the adenoids. This will give relief in breathing whenever the operation is over.

Dangers of the operation. These are generally very slight, but they are not to be neglected, as careless performance or meddlesome after-treatment may easily do harm. There is the danger of the anaesthetic, which in adenoids, consists in the greater difficulty in obtaining air, owing to the obstruction, as the anaesthetic is not taken so regularly and there is more likely to be cyanosis from difficulty of breathing, or a sudden cessation of respiration due to an overdose, but with ethyl chloride, I think the danger of this is at a minimum, and with chloroform, in the hands of one accustomed to it, and who watches its action carefully, the danger is not great.

In the operation itself, the chief danger is excessive haemorrhage. This very rarely occurs and I have never yet seen it once. It does occur though, in haemophylics and cases have been recorded of deaths from this cause. It also may occur in anomalous positions of the arteries, in which case the haemorrhage may be alarming. Reactionary haemorrhage may also occur. Following the application of cocaine or when shreds are left behind, there may be persistent haemorrhage. If haemophylics are not operated on, and if the operation is done as thoroughly as possible, and with sharp instruments, and

the patient carefully watched until the bleeding has ceased, the danger is a very small one.

Injury may be done to the pharynx, especially with the use of strong forceps.

Acute inflammation in the throat, or in the ear may follow the operation. This will be avoided if the adenoids are not removed when the throat is in a septic state or when there is infectious fever about; nasal douches and sprays must be avoided, as they are apt to set up irritation, and the room must be hygienic and dust avoided; the instruments should be absolutely clean, and any remaining tags should be removed.

There should be no recurrence of the adenoids, if they are properly removed and no tags left, but occasionally they do return. More usually, however, as Yearsley points out, it is the symptoms, not the adenoids which return.

Post-operative treatment. After the patient is put back to bed and the bleeding stopped, as it usually does very soon, he should be left quiet with the room darkened so that he may sleep off the effects of the anaesthetic. There is no need to give ice or ice cream to suck, but this may be done. I believe, however, that it is more likely to start again

or to keep up any bleeding.

Five or six hours after the operation some warm milk may be given, and this, with beef tea, should be the only diet until the second day, after which, sloppy foods may be given for another three or four days, and more solid food can be gradually given, as the soreness passes off. It generally takes ten days or a fortnight for the wound to heal. It is not only unnecessary, but it is harmful to use antiseptic douches as acute inflammation may be caused by them. The most that should be allowed is washing the mouth out with warm water, with possibly a little chlorate of potash, or 2 per cent peroxide of hydrogen solution, to keep the parts sweeter and get rid of any bad taste. The child should be kept in bed until two days after the operation, and then in the house for another three or four days. Then if the weather is fine he may be allowed out for a little, but draughts and dust must be guarded against. An iron tonic should also be given.

After that, treatment must be directed to the breaking of any bad habits - nasal speech, mouth breathing, faulty carriage or enuresis. Emphasis must be laid on the fact that the mouth must be kept shut during respiration, and deep-breathing exercises

should be practised to encourage this and to increase the vital capacity. Exercises with light dumbells or indian clubs are also very useful in this way, and help to correct the faulty carriage and to strengthen the muscles. After the obstruction is removed, it merely remains to see that the bad habits caused by its presence are given up, and the child soon returns to normal health and strength, chest deformities, if not allowed to progress too long, disappear and we are happy in the knowledge that with complete removal of the growth we have done our best to return the child to health and the enjoyment of life.